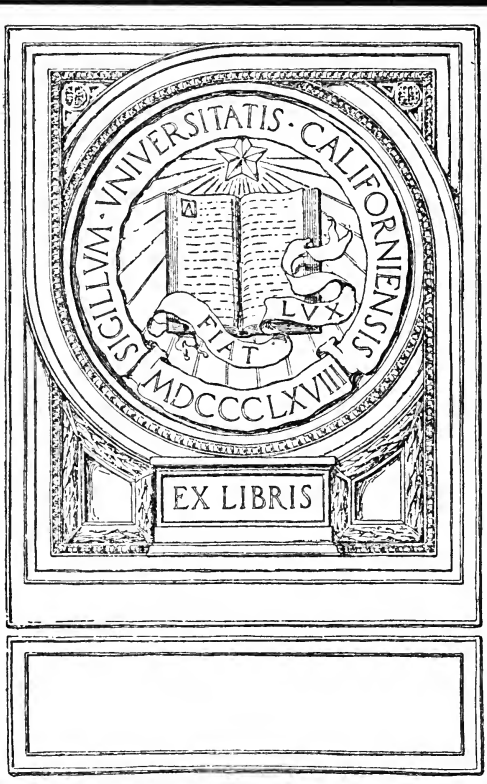
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THE TRAINING AND EMPLOYMENT OF BOMBERS

ISSUED BY THE GENERAL STAFF

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WAR DEPARTMENT,
WASHINGTON, *May 7, 1917.*

The following instructions for the training and employment of bombers are published for the information and guidance of all concerned.

(2593173, A. G. O.)

BY ORDER OF THE SECRETARY OF WAR:

H. L. SCOTT,
Major General, Chief of Staff.

OFFICIAL:

H. P. McCAIN,
The Adjutant General.

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THE TRAINING AND EMPLOYMENT OF BOMBERS.

GENERAL PRINCIPLES.

1. The nature of operations in the present campaign has developed the employment of rifle and hand grenades both in attack and defense to such an extent that the grenade has become one of the principal weapons in trench warfare.

The grenade is essentially a weapon for trench warfare or for very close fighting, and should rarely be used in the open, where rifle fire is much more effective.

Every Infantry soldier and machine gunner must receive instruction in grenade throwing, and must at least know how to use the Mills grenade, and have thrown a live one in practice. It is not every man, however, who possesses the temperament or the qualifications necessary to make a really efficient bomber.

There should be, therefore, in every platoon at least one noncommissioned officer and eight men with a higher degree of efficiency and training than the remainder. These men are available either to work with the platoon or to provide a reserve of bombers for any special object. Some battalions have in addition a platoon of battalion bombers, trained and administered as a separate unit of the battalion organization.

Bombers should be carefully selected; men fond of outdoor games are the easiest to train.

The foregoing is applicable also to Cavalry, who should have squads of expert bombers trained for use in the trenches. At least one noncommissioned officer and four men per troop should be expert bombers.

2. The responsibility for giving all men an elementary but practical knowledge of the use of hand and rifle grenades rests with battalion and company commanders. If possible, one officer per company should be specially trained in bombing work, and there should be one noncommissioned officer per company selected to assist in training and also to supervise the supply and storage of the grenades in charge of the company.

In each battalion there should be a specially selected subaltern officer who will command the battalion bombing platoon, if there is one, assist company commanders as required, and supervise the supply and storage of grenades.

As a general principle, the responsibility for giving to a proportion of men the advanced training necessary for expert bombers should rest with battalion and company commanders. In practice, it is not always possible for battalions under active service conditions to find the time or obtain the necessary facilities. It is, therefore, usually advisable to form brigade or divisional schools to train instructors for battalions, and to hold courses for the training of expert bombers for battalions when no facilities exist for their training in the battalions themselves.

ORGANIZATION.

3. Each platoon in a battalion should have a specially trained bombing squad of one noncommissioned officer and eight men, and should train sufficient reserves to replace casualties and maintain the squad at full strength. The four platoon squads in a company form the company bombers, and must be trained to work together. In the trenches the company bombers are disposed of by the company commander as required, according to the scheme of defense laid down by the battalion commander. Squads should, however, remain with their own platoons as far as possible.

In addition, if desired and approved by the divisional commander, a separate battalion bombing platoon under the battalion bombing officer, consisting or not more than four bombing squads, may be formed and administered as a separate unit. If this organization is adopted, it should be universal throughout the division.

For purposes of training in the actual technique of bombing, company squads may be grouped together under the battalion bombing officer when the battalion is in rest billets, but they must train with their companies when company training for attack and defense schemes is in progress. For any particular operation, e. g., a raid or general attack, when a special organization of bombers becomes necessary, a proportion of the company bombers may be withdrawn and specially trained under the battalion bombing officer for employment in the impending operation. The normal organization should be resumed when the operation is over.

Men employed as bombers must not be allowed to lose their efficiency in the use of the rifle and bayonet, or in the ordinary duties of the infantry soldier.

4. Squads of one noncommissioned officer and eight men will normally comprise two bayonet men, two throwers, two carriers (reserve throwers), one rifle bomber, one spare man (sniper or rifle bomber), and the leader (noncommissioned officer). The squad may be subdivided into two groups if necessary.

Every member of the squad should be thoroughly trained in the duties of every position, so that he can take any place in the squad. If this is done the composition of the squad can be varied to suit circumstances.

5. Each brigade has a bombing officer, who supervises the training of bombers in a brigade, holds periodical grenade exercises of a more advanced nature, and generally assists battalions. His chief duty in action is to insure a supply of grenades to battalions. He is assisted by a sergeant, who should be a thoroughly experienced bomber.

He should superintend the supply and care of grenades throughout the brigade, and should frequently visit battalions in the trenches to inspect grenade stores and bombing posts.

He is responsible, under the brigadier, for carrying out the standard tests (see Appendix I), and for the award of badges to bombers in the brigade.

TRAINING.

6. The object of elementary grenade training (which every Infantry soldier should receive) is:

1. To give the individual a practical knowledge of the working of the grenades in use.

2. To teach him how to throw them.

3. To make him acquainted with the general principles of the organization and the execution of a grenade attack, either as a separate operation or as part of a general attack.

A fair standard of accurate throwing with dummies and a working knowledge of the mechanism of the Mills grenade must be acquired before a man is allowed to handle a live one.

The action in throwing is that of overhand bowling. In the case of a right-handed thrower the body is turned half right, the right hand drawn back and below the waist, arm straight. The left arm is carried forward, arm straight. The left foot is advanced, the weight of the body being on the right foot, body bent back, eyes fixed on the mark (see pl. 1). The grenade is hurled with a circular swing of the right arm over the right shoulder, at the same time the weight of the body is thrown forward onto the left foot, every muscle

being brought into play to propel the grenade (see pl. 1A). Expert bombers usually impart a spin to the grenade; the grenade should leave the hand at the highest point of the swing and should be thrown well into the air. For short distances it can be lobbed from the shoulder by an action similar to that employed in "putting the weight." A grenade may also have to be thrown with a bent arm from positions in a deep trench where a full swing is not possible, and this should be practiced.

Men should be taught that if a grenade with a time fuze like the Mills is dropped in the act of throwing there is ample time to pick it up and throw it out of the trench before it explodes, and that they must do this immediately.[1]

Men must be taught to throw from a standing, kneeling, and prone position, though the latter position will seldom be used.

Distance is important in grenade throwing, but accuracy is essential. Bad direction results in waste of grenades and gives confidence to the enemy. Men must be taught to throw at a definite mark at a known distance even in the stages of preliminary throwing practice in the open. They must be taught to keep their eyes on the target while withdrawing the safety pin.

Men must be trained so that the removal of the safety pin before throwing becomes instinctive and automatic.[2] Practice, by numbers, is of value in the initial stages of training.

A suggested syllabus for an elementary course and some notes on training and physical exercises for bombers are given in Appendix I.

Every infantry soldier should at the conclusion of his recruit training—

1. Have a sound practical knowledge of the mechanism of the Mills grenade and of its use as a rifle grenade.

2. Be able to throw a Mills grenade from behind cover to at least 30 yards with a good degree of accuracy.

3. Understand the principles on which a bombing attack down a trench is made and supported, and have taken part in several such exercises.

4. Have thrown a live Mills grenade in practice.

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[1] In throwing a percussion grenade from a trench care must be taken not to strike it against the back of the trench or this may cause it to explode.

[2] Even when throwing dummies men must be taught always to go through the motion of withdrawing the pin before throwing.

7. The object of the advanced course of training which the bombers of company squads and the battalion platoon should undergo are—

(*a*) To improve accuracy and distance of throwing.

(*b*) To increase knowledge of the various types of grenades and how to handle them; this should include the use of rifle grenades and the various types of catapult and mechanical thrower, also the care and storage of grenades. It is essential that bombers should be instructed in the use of German grenades.

(*c*) The train bombing squads to work together on a regular system of grenade drill, each man having his definite position and duty in the various phases of attack and defense. The combined action of hand and rifle bombers must be carefully studied and practiced.

(*d*) The train parties consisting of several squads to work together with the remainder of the company, in various schemes of attack and defense, both by day and night.

The use of Pippin grenades, smoke candles, rockets and flares may also form part of the advanced course of training.

The following are the principal points requiring attention:

(*a*) Physical fitness is essential. Bombers should be exercised daily in running, marching, physical drill, etc., to keep them fit and supple.[1]

(*b*) Throwing practice should be carried out daily, but should not be overdone.

(*c*) Attack practices against a fire trench should be carried out above ground and while on the move, also in extending laterally to either flank from a section of captured trench by bombing over the traverses and down communication trenches.

(*d*) Defense practice should be carried out from a trench against another trench. The method of repelling a bomb attack down a trench should be practiced, as also the methods of blocking a trench against a bombing attack.

(*e*) After the initial stages it is essential that men should be trained in throwing under service conditions as regards equipment, steel helmets, carriers, etc. Throwing in gas helmets or with box respirators must be practiced.

(*f*) Continual attention must be paid to accuracy of range, which is just as important as accuracy of direction.

(*g*) Various types of trenches should be provided to enable practices to be properly carried out, e. g., traversed fire trenches, zigzag communication trenches with island traverses, etc.

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[1] Some physical exercises for bombers are given in Appendix I.

(*h*) Practice with live graneades at night is necessary.

(*i*) Training in the use of the Mills rifle grenade (No. 23) is of the greatest importance.

8. The duties of the various men in a bombing squad of 1 noncommissioned officer and 8 men are as follows:

Nos. 1 and 2, bayonet men.—These should be specially picked for pluck and alertness; they should be good snap shots and handy with the bayonet. Their duties in action are to attack the enemy with the bayonet and clear the way for further progress; and also to protect the men behind them by rifle fire, if necessary.

In trench clearing they will be ahead of the throwers and work round each traverse in turn. It lies principally with the bayonet men to prevent the fighting becoming a mere grenade duel. Once the enemy is on the run, the bayonet men must give him no opportunity to halt and to commence throwing grenades.

Nos. 3 and 4, grenade throwers.—These should be chosen for their coolness under fire and must be men who can be trusted not to get flurried or lose their heads. They should be picked men, thoroughly trained in accurate throwing, and having a thorough knowledge of grenades. These men should be as lightly equipped as possible. They will require both hands to manipulate the grenade effectively.

No. 5, noncommissioned officer or leader.—He is in charge of the whole squad, and is responsible for controlling the fire, preventing indiscriminate throwing, and regulating the advance of the party. He will signal the progress of his party down a trench by flags or some form of flare signal.[1] In action he will place himself where he can best observe the throwing and control the squad. In trench clearing he should usually be behind the first carrier. A periscope is useful, if available.

He will personally inspect each man of his party before they start off on the task allotted to them. He will examine the arms of Nos. 1 and 2, and insure that magazines are charged, that there is one round in the chamber, and that the bayonet is correctly fixed. He will see that Nos. 3 and 4 are correctly equipped, and that Nos. 6, 7, 8, and 9 each have their full complement of grenades in the carriers, and that each grenade is correctly fuzed. He will make one man of the squad responsible for observation to the flanks and for giving immediate warning of counter attack from the flanks, unless arrangements have been made for their protection by parties in rear.

[1] A flare signal is to be preferred if distinctive and easily seen. There is a risk that flags may be left behind or captured by the enemy, and become misleading.

All the men should know who will take No. 5's place if he becomes a casualty.

Nos. 6 and 7, the carrier's (reserve throwers).—They will keep a watch on their respective throwers, and insure that they always have a grenade handy when required. They must be particularly careful not to follow too close on the thrower lest they should embarrass him in the act of throwing. They must be thoroughly trained in the duties of the throwers, and be ready to take their place in case of casulaties.

Nos. 8 and 9, rifle bombers.—Their duties are to outrange hostile bombers when there is any danger of the attack being checked and thus, when necessary, to cover the advance of the squad. They can also cover the flanks of the squad, when required.

The reserve bayonet man, if only one bayonet man is used in advance of the party, may act as sniper. The duties of the sniper are to keep down the heads of the hostile bombing party, to break their periscopes and thus prevent them from observing their fire, and to protect his own squad from hostile snipers.

9. The following is an example of the method in which a grenade squad, organized as in paragraph 4, should be trained to work down a trench. (See fig. 1.)

On arriving at traverse 2 the bayonet men should place themselves in positions B1, B2, the first thrower at T1, behind the traverse, the first carrier immediately behind him at C1. The noncommissioned officer or leader at L in such a position that he can observe the fire and direct the squad. The leading rifle bomber should normally follow next behind the leader, who can then control both thrower and rifle bomber. The second thrower and carrier will follow next, with the second rifle bomber at the rear of the squad.

Crowding must be avoided, and if possible each man should be at a corner, round which he can move to avoid a hostile grenade.

In support, further along the trench will be the blocking parties, riflemen, Lewis gun detachments, etc.

As soon as the bayonet men are checked, the leader will direct the first thrower to open fire. No. 1 thrower throws grenades as quickly as possible into the section of the trench held by the enemy.

On receiving the order "Report" from the leader, the leading bayonet man moves forward to see into the next bay and the trench behind the next traverse. If they are clear he passes back word and the whole party advances and take up positions at traverse 3 similar to those taken up at traverse 2. In this way the party work down the trench.

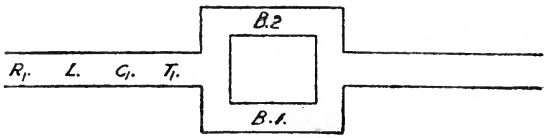
On reaching a branch or communication trench, or deep dugout, the leading bayonet man reports to the leader who decides on the action to be taken.

(NOTE.—Every number in the squad should carry a proportion of smoke bombs for dealing with deep dugouts.)

The enemy once on the move should not be given time by the bayonet men to make a fresh stand. The bayonet men should always attempt to close with the enemy. A rapid and continuous advance is most likely to prove successful, and grenade throwing should only be resorted to when the bayonet men are held up.

In the event of a communication trench being encountered, as in the plan given, another squad would be brought forward to work down it, the first squad proceeding along the main trench until the objective is reached. If no provision has been made for a second squad—the communication trench not being anticipated—the leader at once sends the second bayonet man, thrower, and carrier, to work down the trench in question, accompanied by a blocking party and riflemen if considered necessary.

Should an island traverse be encountered, the leading bayonet men must watch both sides of it whilst the grenadiers are throwing grenades.



10. A suggested syllabus for an advanced course, and the tests which a man should be required to pass at its conclusion, are given in Appendix I.

Once men have been thoroughly trained in the groundwork of bombing, as much time as possible must be given to combined schemes with the remainder of the company, and the following in particular must be studied and practiced:

(*a*) The cooperation of Lewis guns and Stokes mortars with bombers, either in a bombing attack down trenches or against a hostile machine gun which is holding up an advance.

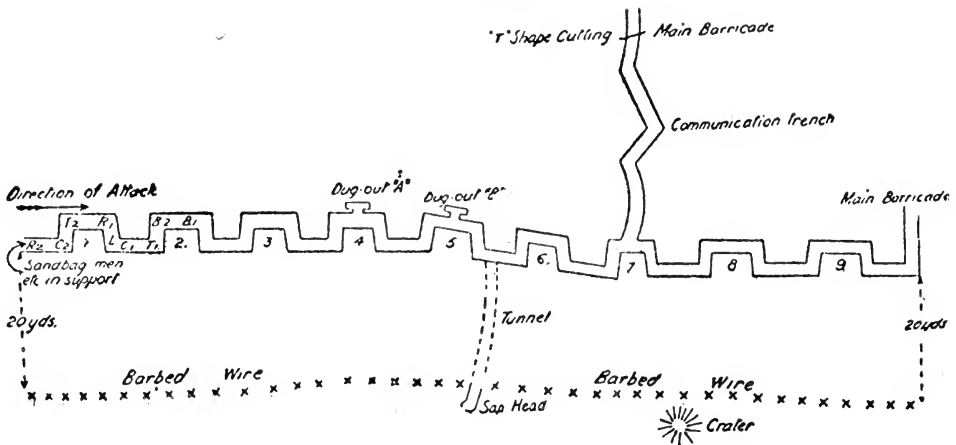
(*b*) The organization and action of bombers and the men supporting them in an attack on trenches with deep dugouts, so that, immediately on entry into the hostile trench, men may be posted at all entrances to dugouts to prevent the enemy issuing.

FIG. 1.—Plan of attack, showing a section of trench made for practice attacks.

B=Bayonet man. L=Leader (N. C. O.)

C=Carriers. R=Rifle bomber.

T = Throwers.



(*c*) The rapid formation of a bombing party in an emergency, either in attack or defense, from the first men available.

(*d*) The use of smoke in the attack, either from 4″ Stokes mortars, P grenades, smoke candles, or rifle grenades. Smoke can frequently be used most effectively by bombing parties in an attack on a hostile machine gun or strong point, or in village fighting, or to screen the retirement of a raiding party.

PRECAUTIONS AGAINST ACCIDENTS DURING INSTRUCTION.

11. The following precautions against accidents will be taken at lectures on grenades and during practice. Some of them are applicable at all times. These are marked by an *:

(1) No detonators or grenades with charges in them will be used unless a qualified officer or warrant officer instructor is present.

(2) At lectures only dummy grenades (that is, grenades without an explosive charge in them) and dummy detonators (that is, models in wood or metal to represent detonators, or empty detonators) will be used.[1]

(3) Dummy grenades and dummy detonators will be specially marked.[2]

(4) A dummy grenade will not be reloaded to serve as a filled one; its use as a dummy may have worn out or injured some part of it and may thus occasion a premature.

(5) Before commencing a lecture, or a practice in which dummy grenades are to be thrown, the instructor will examine the material

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[1] It is advisable that demonstrations with filled grenades should not take place inside a building.

[2] Dummy detonator holders containing dummy detonators are supplied for No. 3 and No. 20 rifle grenades. They are distinguishable from live detonator holders by not being closed at the bottom.

Dummy detonators are at present issued empty and must be tested by inserting a splinter of wood, wire, etc. They will shortly be issued with a hole in the end about one-third of the diameter of the detonator, so that daylight can be seen through them. It should be noted that live detonators have four tiny holes in the end.

Dummy igniter sets are supplied for No. 5 Mills grenade. They are distinguishable from the live sets by a hole, about one-third of the diameter of the detonator in diameter, at the end of the detonator, and also by the cap having no central hole.

If no service dummy detonators are available, models in wood or tin should be made and used; unloading live detonators is a delicate operation, wastes fulminate, and should not be permitted.

Dummy grenades are supplied to represent No. 3, No. 5, and No. 20 grenades. They are painted white.

For numbers issuable to units and schools in France see G. R. O. 1473 and 1640.

very carefully in order to insure that there are no detonators or filled grenades (that is, grenades charged with explosive) included in it.

(6)* Men will be warned that live detonators, filled grenades, and especially filled grenades with live detonators in them (usually known as fused grenades) must be handled with care. The following rules should be impressed on all:

(*a*) Do not seize a detonator; hold it between forefinger and thumb.

(*b*) Do not drop, tread on, hit, or attempt to bend a detonator, or treat one roughly.

(*c*) Do not force a detonator into a grenade or holder. If it does not fit easily, another detonator must be used, and the defective one (it may be a wrong one, see pl. F, which gives various types) placed in a special box, and reported to an officer, who will subsequently arrange for it to be thrown into deep water or destroyed.

(*d*) Do not force a safety fuse into a detonator when making a connection, but work it in gently for three-quarters of an inch, which is as far as it can go.

(*e*) Do not attempt to pull a detonator off the safety fuse once it is crimped on; the only safe way is to cut the fuse above the crimping if it is necessary to remove the detonator.

(*f*) Do not leave a detonator lying about; a comrade may step on it and be injured.

(*g*) Do not hold a friction fuse lighter by the thick end, as you may set it off.

(7) At instruction a reliable man should be placed in charge of the detonators and kept apart from the rest of the party; he should issue detonators only on the order of an officer.

(8) At practice in inserting live detonators only one detonator should be used for each party and the men should come up singly, the others keeping at a safe distance or behind a traverse.

(9) A detonator or igniter will not be inserted in a grenade except on the practice ground and then immediately before the grenade is to be thrown, or for instructional purposes, as in 8 above.

(10)* The fusing of grenades by the insertion of the detonator (detonator holder) or igniter will not be carried out in proximity to a stack of grenades or boxes of grenades. There should be a definite place chosen, e. g., a hole in the ground with a tub of water in it, into which a grenade can be quickly thrown if ignition takes place, and cover should be close at hand for the men.

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(11) At all practices with fused grenades the instructors and the classes will wear steel helmets.

(12) During individual practice with fused grenades not more than one instructor and the thrower (firer in the case of rifle grenades), or in all two persons, will be allowed in the throwing trench at the same time; the remainder of the class will take cover before the grenade is thrown. At least one instructor will be present with these men to insure that they do not expose themselves.[1]

Rifle grenades, should, in elementary instruction, be fired by a lanyard through a box loophole or pipe built in a breastwork or parapet, the grenade being inserted from the front after the rifle is in position, and not fired until the two persons mentioned above are behind the breastwork or parapet.

(13) During practice with live grenades the danger area must be considered as a circle with a radius of 200 yards from a point where the grenade explodes; no one should be allowed within the danger area except under suitable cover.

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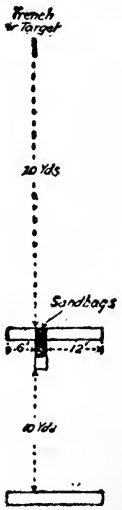
[1] The following is a safety arrangement which has been found effective for preliminary instruction in hand grenade throwing; as soon as the men are sufficiently skilled they should throw from a trench. Grenades are thrown from behind a wall 5 feet high at a target. A wing 5 feet high (with sandbags on top of the forward portion to make it 7 ft. 6 in.) separates thrower and instructor from the rest of class, or the rest of the class may be behind a barricade further in rear.



(14) Grenades that fail to explode should be noted and the bombing ground carefully cleared up after conclusion of the day's exercises; on no account should filled grenades be left lying about.

(15) A live time fuse grenade failing to explode when thrown will not be lifted until at least one minute has expired, and then only after careful examination. A precussion grenade which fails to explode will be destroyed without lifting. This can be done by firing a guncotton primer beside it.

(16) Should a fused grenade not be thrown, the detonator, or igniter in case of No. 5 (Mills) grenades, will be removed from it as soon as possible and in any case before it is returned to store; on no account will such an operation be carried out in any grenade store. It must be done on the ground under proper precautions for safety.

(17) The safety fuse used in the igniters of No. 5 (Mills) grenades will be examined occasionally to see that it is not cracked at the bend, as this is likely to cause erratic burning. This applies to the igniters in store as well as to grenades when being fused in the first instance.

(18) All the special precautions given in the descriptions of the different types of grenades in Appendix III will invariably be observed.

(19) All inspection should be carried out in a good light.

EMPLOYMENT OF BOMBERS IN THE ATTACK.

12. Bombers may be employed in—

(*a*) Local enterprises or raids, designed to inflict loss on the enemy but with no intention of making any advance or holding a captured trench.

(*b*) Local attacks made by bombers and supported by other infantry, with the intention of capturing and holding some length of trench or position.

(*c*) General attacks on a large scale, in which bombers are allotted special rôles in conjunction with the main infantry attack.

The organization of parties and arrangements made will naturally differ somewhat in each of above cases, but the principles remain the same and success will depend on—

(*a*) Careful preliminary reconnaissance and preparation.

(*b*) Every party being given a definite task and organized accordingly; every man in each party knowing his task and being trained for it; and sufficient trained men being in reserve to replace casualties.

(*c*) Accurate and disciplined throwing.

(*d*) Arrangements for keeping up a sufficient supply of grenades.

Generally speaking, in the attack, bombing is of value for clearing small lengths of trench and for close fighting after a trench has been rushed; but experience has shown that on great or rapid progress can be made by bombing, and an assault across the open after adequate preparation will usually be a quicker and in the long run less costly operation than bombing attacks on a large scale.

ORGANIZATION AND EXECUTION OF A BOMBING ATTACK.

13. When preparing a grenade attack a definite objective must be selected. An air photograph of the position must be carefully studied, and the best line or lines of attack be chosen. All side trenches must be carefully noted and definite orders given whether they are to be—

(*a*) Picketed by bombers and bayonet men as a temporary measure.

(*b*) Permanently blocked, in which case a working party, as well as the bombers and bayonet men, must be detailed beforehand.

(*c*) Used for a secondary attack, in which case a properly organized column must be detailed.

A separate party must be detailed beforehand for every side trench. If the air photograph is not sufficiently clear, and side parties can not be told off for particular trenches, the parties should be numbered (No. 1 side party, No. 2 side party) and used as occasion requires.

Arrangements for dealing with dugouts must also be made. P. grenades are most effective against deep dugouts[1] and a supply should always be carried by the leading bombers. Parties placed in close support should be detailed for the systematic clearing of a system of dugouts.

The protection of the flanks of a bombing attack by the fire of machine guns, Lewis guns, or snipers against a hostile counter attack across the open must always be arranged. Lewis guns can frequently accompany the bombing party. They may be able to enfilade some portion of a hostile trench; they can always assist in keeping down hostile rifle fire; and they will be available to defend the captured trenches or any block that may be made when the operations have come to an end.

Whenever possible Stokes mortars should be used to assist bombers. They should be so placed that they can bring a heavy, concentrated, and continuous fire on a point previously fixed in the enemy's trench,

[1] They usually set fire to and destroy the dugout, and should therefore not be used indiscriminately in captured trenches which it is proposed to hold, as our men will thus be deprived of the shelter of the dugouts in a subsequent hostile bombardment.

about 50 yards beyond the length to be secured by the bombers. The position of the mortars may either be in the trench down which the bombing raid is made, so as to give enfilade fire, or in trenches opposite the objective. A combination of frontal and enfilade fire should be employed whenever possible.

The following points should be attended to by Stokes mortar officers:

1. The target should be carefully registered before the operation commences.

2. Fire should be opened at the moment of attack, and continued until the piece of trench gained is consolidated.

3. A plentiful supply of ammunition should be at the mortars before the attack is undertaken.

The Stokes mortar can also be used to fire ahead of bombers as they proceed down the trench, but this method should only be employed when observation is so favorable that the Stokes mortar officer can make certain that he can follow the movements of the bombers down the trench. Rifle bombers, using the Mills rifle grenade (No. 23) are more suited for close support in this way, as their fire can be directly controlled by the leader of the bombing squad.

When the operation consists of a raid into enemy's trenches, to return when the object is accomplished, arrangements for bringing back wounded should be made. If it is intended to gain ground and hold it, preparations for consolidating the position must be made beforehand, troops must be detailed to hold definite sections of it, and the necessary tools and sandbags must be taken up by them. Arrangements must also be made for establishing grenade stores in the captured trenches.

The various accessories required, such as periscopes, flags, or flares to signal progress, electric torches for dugouts, etc., must be provided.

The supply of grenades is dealt with in section 18.

14. The method of attack by a small bombing squad working down a trench has already been described (sec. 9).

For operations on a larger scale along a line of trenches in which we have already established ourselves, or to drive the enemy out of a large section of our trenches which he has captured,[1] the attacking party should be organized into point, support, side parties (for dealing with side trenches), main body.

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[1] See, however, end of sec. 12.

The composition of these parties will vary according to circumstances. Their duties are as follows:

The point is the party which makes the actual attack. It will usually consist of one complete bombing squad, organized as in section 4. The attack is carried out in a series of rushes from one traverse to another, the bayonet men leading. Immediately before each rush the throwers throw grenades into the trench to clear it for as great a distance as possible. Wherever there is room the throwers, whether two or three in number, should throw simultaneously and divide the distance between them. One should be responsible for the short throws, and one (the best thrower) should always throw as far as he can. The advance can also be supported by the rifle bombers using the Mills rifle grenade. Everything depends on the accuracy of the throwing; grenades which burst outside the trench are wasted. The attack must be pushed home with vigor, and must never be allowed to degenerate into a grenade duel. The enemy should be kept on the run and allowed no time to make a stand.

The carriers are responsible for the immediate supply of grenades to the throwers. Behind the carriers should come the officer directing the attack. He should have a periscope for observation purposes. He exercises a general control over the throwing discipline and regulates the rate of the advance. He also arranges the relief of the men of the point from the support. Men so relieved join the main body, not the support.

The duties of the support (a complete squad from the same company as the point) are to supply the reliefs for, or replace casualties in the point, and to clear dugouts. They should also be prepared to get out of the trench and work round the flanks, taking what cover they can find in shell holes, etc., when the point is held up by a hostile block or for any other cause. This method of clearing a trench is frequently most effective. The thrower can see what he is doing, and gets a much longer and more accurate throw when throwing from the open than when throwing from the trench. The movement of these flank throwers is dependent on our own machine guns or Lewis guns and snipers being able to keep down those of the enemy.

For clearing dugouts, two Pippin grenades should be thrown into them. This will usually have the effect of driving the survivors of the enemy up into the open . If no Pippin grenades are available after two grenades have been thrown into the dugout, two bayonet men should go down with an electric torch. They should be on the

lookout for the enemy hiding in underground passages off the entrance to the dugout.

The support also hold any side trench until the arrival of the side party detailed for that trench.

The support is reenforced from the main body, not from the side parties, which are immediately in rear of it.

Side parties form distinctive units and will not be used for reenforcing. The parties will be numbered and every man should know the number of his party. Each party usually consists of one squad. The number of parties detailed will depend on the number of side trenches to be blocked, but only two parties should move in front of the main body. Each side party should understand whether it is to picquet the trench or to block it permanently, in which latter case a working party with sandbags should join them from the main body.

An officer should be in charge of the side parties and detail each party to its particular trench. He must also look out for any attempt by the enemy to counterattack across the open.

The main body is responsible for keeping the support up to its full strength, and will garrison and consolidate all ground won. It is also responsible for organizing a chain of supply from the advanced grenade depot to the forward parties (see par. 18).

Some Lewis guns will usually accompany the main body. The support of machine guns and Stokes mortars should be arranged if possible.

EMPLOYMENT OF BOMBERS IN AN ATTACK ON A LARGE SCALE ACROSS THE OPEN.

15. The chief duties of bombers in an attack on a large scale will be to clear trenches over which the assaulting troops have passed, to protect the flanks of the attack when it has reached and occupied the enemy trenches, to secure the enemy communication trenches, and to form barricades so far down them that grenades can not be thrown into the main trenches just captured.

Attacks often succeed at some points and not at others, with the result that our own and the enemy's infantry are in the same trench. Bombers are invaluable in such cases.

Bombers may also be of great use in street or wood fighting and for patrol work at night. The strong points and underground defenses in villages, as well as posts and barricades in the streets, call for the special use of grenades. The combination of hand and rifle grenades,

smoke bombs, machine guns, and light mortars is of the first importance in village fighting. The consolidation of captured woods has often proved a very difficult operation owing to strong enemy detachments having been able to conceal themselves during the advances of our infantry, and subsequently to develop machine-gun and rifle fire behind and on the flanks of the captured line. Strong clearing parties, largely composed of bombers, must therefore be detailed to deal with organized opposition after the assaulting troops have passed on.

Rifle grenades, particularly the Mills, are often of great value for dealing with hostile machine guns or strong points which check the attack.

Bombing squads and parties should therefore be detailed for the following duties:

(*a*) To clear trenches and areas over which the assaulting troops have passed.

(*b*) A party to deal with each communication trench leading toward the enemy from the line which forms the final objective of the attack.

(*c*) Parties on either flank of each body to block trenches on the flanks or extend the ground won laterally.

Of the above the most important duty is that in (*a*). Experience of recent attacks has shown that it is essential to detail strong clearing parties in order to prevent the issue of the enemy from dugouts or other shelter in rear of the assaulting troops.

Plans for the actions of bombing squads should be carefully thought out beforehand and should be based on a study both of the ground and of the air maps of the enemy trenches. Each bombing squad should be made to understand very clearly the main objective of the attack as well as its own immediate objective, and also how far beyond or to the flanks of such objective it is to proceed. When possible, orders should be given in advance with regard to the fire and communication trenches which are to be stopped and the points at which this is to be done.

The position of bombing parties in an attack must depend on the tasks to which they are allotted. The parties detailed to clear the first trenches in rear of the assaulting troops should follow close in rear of the leading line of infantry, while parties to clear trenches farther forward should follow in rear of the second or succeeding lines. Parties to deal with communication trenches when the final objective is reached are probably better placed with the first line, as if

they follow in rear it will be harder to control them and direct them on the required point.

In addition to the special parties detailed, the bombing squads of companies in the front line should be on the flanks of their companies. They are then at once available to work outward should the attack succeed at one point and fail at others.

EQUIPMENT OF BOMBERS.

16. Bombers should be as lightly equipped as possible. In the case of grenade operations and raids, the men who are actually to throw grenades should not carry rifles, but may be armed with revolvers if they have been taught to use them, or with a bayonet or special stabbing knife or weapon for hand-to-hand fighting, such as an ax or knobkerrie. In a general attack all men will usually carry rifle and bayonet. Bombers must therefore be taught to throw with rifle slung over left shoulder. Steel helmets should be worn by all men taking part in grenade attacks.

Grenades are best carried in a canvas bucket or haversack to hook to belt (see Appendix II).

BLOCKING TRENCHES AGAINST A GRENADE ATTACK.

17. All bombers must have a knowledge of the best methods of blocking a trench. In all attacks they should be supported by a party of men with sandbags and tools, under an experienced noncommissioned officer, so that, while the bombers are keeping the enemy at bay, a strong barricade can be built as quickly as possible.

It is advisable to work along the trench for a distance of 50 yards or so farther than the point to be barricaded in order to drive the enemy back out of grenade-throwing distance. A second barricade of a temporary nature should be erected at this advanced point, and constant fire kept up by the bombers, while a working party fill in the trench between the advanced and near barricades as rapidly as possible, placing wire in it to hinder the enemy from digging it out. It is advisable, as a rule, to attach a small number of engineers to the party, with a view to blowing down the enemy's trench by explosives. As soon as a clear field of fire has been established from the point to be held, the bombers retire from the advanced barricade.

In making a permanent barricade, provision must be made for dugouts for the bombing party and riflemen. The best form of dugout is one built off the main trench in a T shape. This should be

protected from counter grenade attacks by wire netting, and a grenade depot should also be built.

A "blocking-gate" device is shown in plate A.

It is of advantage to dig a sap leading toward the enemy from each side of the trench which has been blocked, somewhat in the form of a "trident." Grenades can thus be thrown into the blocked trench from three points simultaneously. (See fig. 2.)[1]

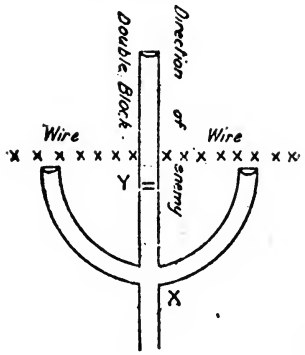


Fig. 2.

[1]The point X, where the saps branch off, should be out of grenade-throwing distance from Y, the rear block.

There are two main types of trench which it may become necessary to block:

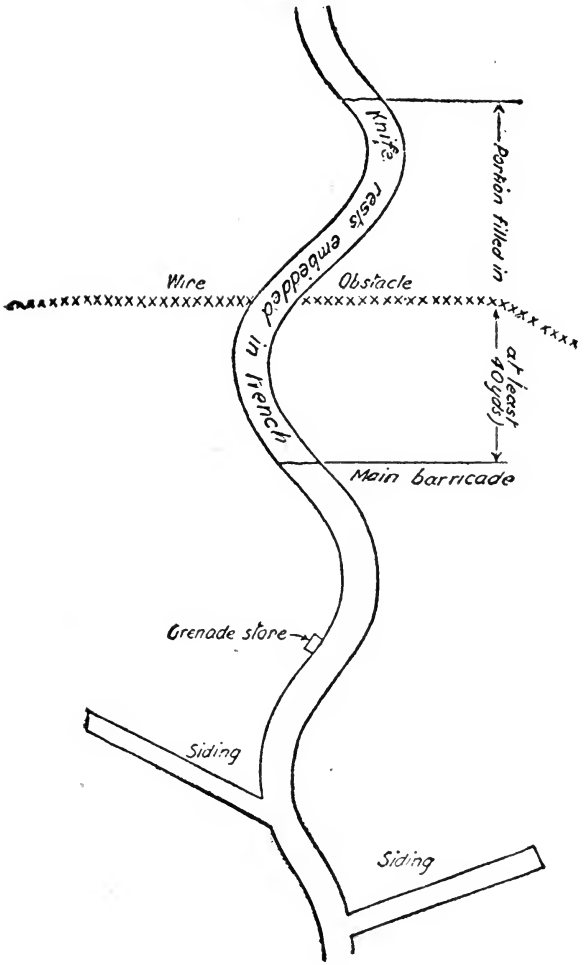
(*a*) The winding communication trench, down which it is impossible to fire.

(*b*) The straight trench with traverses, along which it is possible to fire when the traverses are destroyed.

(*a*) To block the winding trench effectively, a section of it must be absolutely destroyed. The length filled in should be sufficient to give the defence ample time to shoot any men attempting to rush across the gap. An obstacle should be placed across the destroyed portion and continued for 10 yards or so on either side. There is no object in filling in the trench for a greater distance than it is possible to throw a grenade, as it would only be dug out again

[1] A straight trench can be used in a similar way (see fig. 7).

Fig. 3.


Knife rests embedded in trench
Portion filled in
Wire
Obstacle
at least 40 yds.
Main barricade
Grenade store
Siding
Siding

by the enemy up to the point where our grenades become effective. A barbed-wire knife-rest or similar object placed in the trench before it is filled in will considerably increase the difficulty of any attempt to dig out the destroyed portion. (See fig. 3.)

Should it be possible to fill in only a short length of the trench (15 or 20 yards), the bombers should not be stationed close up to the destroyed portion, where they would be constantly exposed to grenades. They should be stationed sufficiently far back to be safe from grenades thrown by men at the enemy's end of the blocked portion. From this position they can occasionally run up and throw grenades into the trench beyond the gap. Any attempt on the part of the enemy to dig out their end of the gap should be met by vigorous and continuous grenade throwing until the digging ceases.

In order to guard against a rush across the gap, sidings at right angles to the trench should be made. A Lewis gun is very useful to cover the gap.

(*b*) In the case of a straight trench with traverses (fig. 4), the traverses in a portion of it should be cut away and the earth be used to fill the recesses. A strongly built sandbag breastwork is then made across the trench, with loopholes for observation and fire. The trench behind the breastwork is roofed over to give protection from grenades, with a traverse to protect the men from grenades which burst beyond them. To hinder any attempt of the enemy to rush across the cleared portion of the trench, loose strands of wire should be placed in it. A Lewis gun, if available, can be mounted in the breastwork. In order to guard against damage to the breastwork by grenades continually being thrown against it and bursting at the foot of it, a catch pit can be dug, into which they would roll before bursting.

Sidings should be made as before.

In making a block in a communication trench, care should be taken to level off the earth on either side of any portion of the trench held by us within grenade-throwing distance of the enemy, in order that badly thrown grenades may not roll down the slope into the trench (see figs. 5 and 6).

Fig 4.

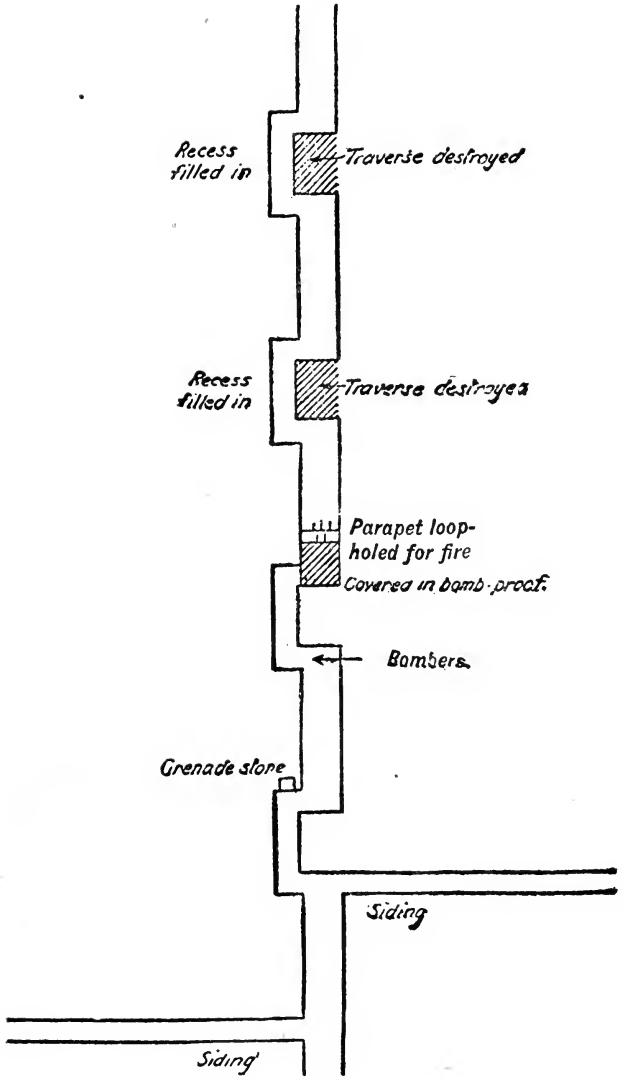
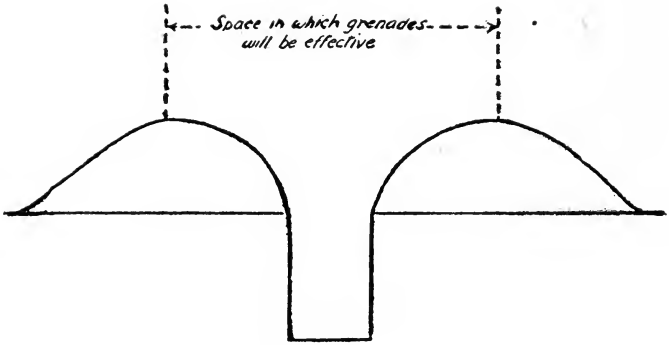
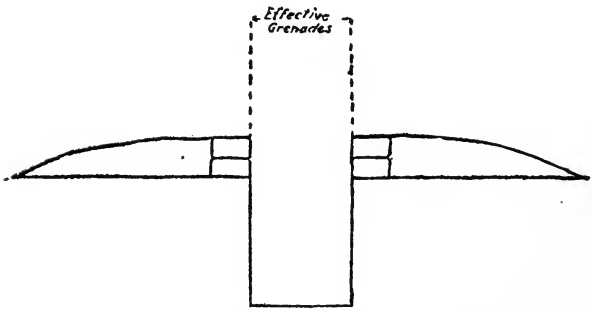

Recess filled in
Traverse destroyed
Recess filled in
Traverse destroyed
Parapet loop-holed for fire
Covered in bomb-proof
Bombers
Grenade store
Siding
Siding

Fig. 5.



Usual form of communication trench.

Fig. 6.



Trench with earth levelled off.

SUPPLY OF GRENADES IN ATTACK.

18. The supply of grenades is perhaps the most important point in the organization of a grenade attack. Unless a constant and steady supply of grenades can be kept up, the attack will fail.

A. Supply During a Bombing Attack.

In the case of a grenade attack from a line of trenches in which we are already established, the principles on which this supply must be based are:

(*a*) Establishment of grenade depots, which must be kept filled. There should be one close to the spot from which the attack starts, one at battalion headquarters, and one near brigade headquarters to feed the latter.

(*b*) Preparation of each grenade by inserting the detonator ready for use before it leaves brigade headquarters and by examining safety pins to see that they can easily be withdrawn.

(*c*) An initial supply carried by the men taking part in the attack. Every man should carry a supply of grenades.

(*d*) Certain and rapid transit of grenades from the depots to their destination in order to maintain the initial supply. The most satisfactory method is to have a chain of men at intervals from the advanced depot to the front of the attacking party, passing supplies up from one to another. Attempts to keep up the supply by sending men backward and forward along the trench for fresh supplies usually breaks down, owing to the trench becoming blocked or to the carrying parties being waylaid or lost.

The number of men required to form a chain at suitable intervals from the advanced depot to the final objective requires careful calculation.

The chain method may fail or prove costly in personnel if a hostile artillery barrage is formed.

Another method is to have a definite unit, e. g., a company, specially detailed to carry forward grenades. A unit so detailed should employ whatever method is best suited to the tactical situation, but must begin its work of bringing up supplies of grenades immediately the attack is launched.

(*e*) A recognized chain of responsibility for supply. Os. C. companies should be responsible for organizing the flow of bombs from advanced depots to forward parties, the battalion bombing officer from the battalion depot to the advanced deopts, and the brigade

bombing officer from the brigade to battalion depot. The brigade depot is replenished from the divisional ammunition column.

The types of grenade carriers in use are described in Appendix II.

B. Supply During a General Attack.

In the case of a general attack the same principles should be observed as far as possible, advanced depots being established in the captured trenches as early as possible, and arrangements made to insure a continual supply to meet requirements. Carrying parties must be detailed to take forward grenades, and the initial supply with the assaulting lines should be as large as possible. With this object each man in the assaulting lines should carry two or three grenades. It is very necessary to insure by good discipline that these grenades are not wasted by indiscriminate throwing.

Prior to the delivery of the attack depots of grenades should be established along the whole front system of trenches, and particularly along the communication trenches, in which a number of grenade stores should be prepared and be clearly marked and their position made known to all ranks. The farther grenades have to be carried during an attack the smaller will be the numbers which actually reach the leading troops. Moreover, communication with the rear may be cut off by hostile artillery fire.

The following initial distribution is suggested:

(*a*) To squads detailed for bombing as many grenades as can conveniently be carried. (Note.—It is a mistake to overload bombers and only leads to waste of grenades, as men will hasten to get rid of part of their load.)

(*b*) Two Mills grenades to all other infantry soldiers in the battalions detailed to open the attack. It will frequently be advisable to collect these on reaching the objective in order to form a reserve for the bombing squads.

(*c*) Battalion depots in the front system of trenches.

(*d*) A brigade depot farther in rear from which the battalion depots are replenished.

Adequate bomb-proof cover must be provided for these depots.

There should be a reserve of carriers (buckets or bags) at all depots.

All bodies of men sent forward in support of the attack should carry grenades. The issue of these grenades should be made from the rearmost depots if possible, so as not to deplete those farther forward; arrangements for replenishing the depots must be worked out beforehand.

In the enemy's trenches supplies of his grenades are usually to be found. Bombers should therefore know how to use them. Details of the construction of German grenades are given in Appendix IV.

The following are most important points in the supply of grenades in a general attack:

(*a*) Every officer and noncommissioned officer must know the position of main grenade stores.

(*b*) Forward depots in the captured trenches must be established as early as possible. When a position is captured, a supply of grenades should at once be sent for, whether immediately required or not. The approximate position of forward depots should be selected beforehand, and made known to all ranks.

(*c*) The system of carrying must be organized.

(*d*) Waste must be strictly prevented, and grenades collected from casualties when possible.

A summary of some instructions issued by a brigade will be found in Appendix V.

EMPLOYMENT OF BOMBERS IN THE DEFENSE.

19. The main infantry defense of a line of trenches against hostile infantry will be by rifle and machine gun fire. Parties of bombers, however, may be distributed throughout the front system of trenches for special purposes. Except in those parts of the line where the enemy's trenches are within grenade-throwing range, bombing parties need not actually be located in the fire trenches. The best position for them is in the support trenches close to the main communication trenches leading to the fire trenches, whence they can make an immediate counterattack should the enemy succeed in gaining a footing in the front line.

A "trench" or "bombing pits," dug about 20 yards behind the front trench, from which grenades can be thrown into the front trench, is an advantage.

Where mine craters, sapheads, hollows, etc., provide ground which neither rifle nor machine-gun fire can cover, bombing posts should be established so as to deny such points to the enemy. These posts should be sheltered as far as possible from enemy grenades by wire netting and small traverses.

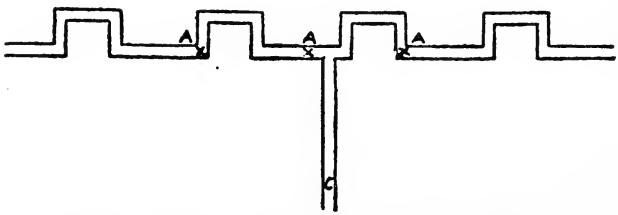
Saps forward from the front trench should be covered to beyond grenade-throwing distance from the front trench with a network of overhead wire of about 1 foot mesh. This will prevent parties of

the enemy who may capture the sap from throwing their grenades into the front trench, but will not prevent the grenades of the defenders from falling among the enemy in the sap. The head of the sap should not be wired, so that when it is occupied by the bombers of the defense they can throw their grenades from it to both front and flanks.

Unless a sap is within grenade-throwing distance of the enemy, occupation by bombers is not necessary; but a bombing post should be established in close proximity to all saps.

The trident trench as a means of defense has already been referred to. A similar arrangement can be carried out for the defense of a mine crater or at any point where a communication trench joins a main trench, e. g.,

Fig. 7.



Bombing posts at A, A, A, can all throw into C simultaneously.

The action of bombing parties should be laid down in the scheme of defense of each section of the line, and each party should be practiced in carrying out its particular rôle, so that every member of it may know what he has to do.

It is essential that a counterattack by bombers should start immediately, before the enemy has had time to arrange his defense. In the case of small counterattacks from the support trenches, the bombing squad, which should be permanently stationed close to the communication trench, moves forward at once, followed by the remainder of the platoon. If it is necessary on reaching the fire trench to turn outward and attack in both directions, every man must be detailed beforehand as a right-hand or left-hand man.

In the case of a counterattack on a bigger scale from the reserve trenches, a properly organized column with point, support, side parties, and main body must be detailed (see sec. 14). The men should be told off beforehand and stationed in the order in which they will advance, i. e., with the point nearest the communication

trench. The attack can then be launched at a moment's notice. The men file into the communication trench in order, taking their grenades from the grenade stores as they pass. These grenade stores should be established at the junction of each communication trench with the reserve trench. The grenades should be kept ready packed in carriers.

A counterattack across the open can often be prepared and supported with effect by the fire of rifle bombers.

CARE AND STORAGE OF GRENADES.

20. Grenades stored in trenches should be kept ready fused with the detonators inserted. Each company in the front line should have a supply on company charge. Company and platoon commanders should be responsible that all grenade depots on their charge are kept up to strength. The company bombing noncommissioned officer should inspect stores daily. Grenades should be distributed in a number of dry and closed bombproof depots established at frequent intervals in the trenches, in the "grenade trench," and near the head of communication trenches. The principle to be observed is that there should be no more grenades than absolutely necessary in the front line, and that reserves should be echeloned in rear, as near to main lines of communication as possible. The depots should be well marked, easily accessible and kept distinct from other stores. A good type of grenade depot is one built in a T-shaped trench off the main trench. The grenades should be inclosed in tin-lined boxes, the lid of which must be made airtight, in the depots to prevent deterioration. Old ammunition boxes can be adapted for the purpose.

Conspicuous notice boards to show the position of grenade depots and the way to them should be placed in all trenches.

All grenades sent to the trenches must be constantly turned over. This can be done, if ordinary expenditure is not sufficient, by bringing back grenades from the trenches and using them in grenade training schools.

Stores used for grenades and detonators in the trenches, rest billets, or elsewhere will not be used for any other purpose. The use of naked lights and smoking is forbidden in them. No inflammable material should be allowed in a grenade store. Ventilation must be arranged.

The insertion of detonators should be carried out under the driest possible conditions. The base plug of the Mills' grenade should be well smeared with vaseline before it is screwed home.

A supply of vaseline or mineral jelly should be kept at brigade and battalion grenade dumps and the grenades should be frequently examined and kept free from rust, special attention being paid to the lever and safety pin.

The following may be taken as a rough guide to the number of grenades required by a brigade with two battalions in front line: For each company in front line, 500; in each battalion store, 1,000; in brigade store, 3,000.

APPENDIX I.

SUGGESTIONS FOR SYLLABUS OF TRAINING.

A. Elementary Training.

The following subjects should be included in the course:

Lectures.—(*a*) Handling grenades, and precautions necessary.

(*b*) Description of grenades in use and detailed description of Mills grenade.

(*c*) Care and storage of grenades.

(*d*) Organization and tactics of bombers in attack and defense, including tactical use of rifle grenades.

Practical.—(*a*) Throwing dummy grenades in open and in trenches.

(*b*) Group practice, one man throwing grenade, one keeping up supply of grenades.

(*c*) Practice in squads of eight, under a leader, working up trench with dummy grenades.

(*d*) Throwing live grenades, individual practice.

(*e*) If possible, practice in squads of eight, under a leader, with live grenades.

Following is a suggested syllabus for an elementary course when only three days are available:

First day.—Opening lecture on detonators, fuses, igniters, and grenades, and their properties.

Demonstration of action in throwing grenades in various positions in the open by instructor, followed by practice by class.

Detailed description of Mills grenade and precautions to be taken with it.

Practice in throwing dummy grenades at 25 yards—(i) Into a trench or pit; (ii) out of trench; (iii) over a traverse.

Demonstration of the use of the Mills grenade as a rifle grenade.

Short drill to explain duties of various men in a grenade party.

Second day.—Questions on previous day's work and drill.

Practice in throwing with dummies individually and in groups, in the open and from trenches.

Lecture on care of grenades.

Lecture on organization and tactics of bombers.

Demonstration by trained bombing squad of method of working down a trench.

Third day.—Questions on previous day's work.

Lecture on organization and tactics of bombers.

Individual throwing of live grenades.

Practice in squads of eight, under a leader, working down trench with dummy grenades.

Demonstration of method of blocking a trench.

Squads of eight, under a leader, working down trench with live grenades.

There should be a prepared training ground at all rest billets, so as to prevent delay in training when battalions come out to rest.

Men should first of all be practiced in throwing at measured distances in the open with dummies.

A good method of preparing the ground is to mark on it a series of double lines, each double line being 3 feet wide, to represent the width of a trench. The base lines, also 3 feet apart, between which the throwers stand, should be 20 yards from the first double line; then come four more rows beyond the first one, at distances of 25 yards, 30 yards, 35 yards, and 40 yards.

Having once mastered the first distance the men should then throw at the farther distances in turn.

The squads can be divided into two groups of four men, one group returning the dummies to the group throwing from the base line; by this means no time will be lost and every man will be kept interested in the proceedings.

As soon as the man has obtained a certain amount of proficiency in throwing in the open he should next be practiced in throwing from behind cover, which is the normal condition under which grenades are thrown in action.

Arrangements for practicing in throwing should be provided in all billets and handed over when the occupants are changed as "billet stores." "Cages," as described below, are suitable for throwing practice. They require little material, either for construction or upkeep, and instruction is as good as with trenches. They are especially suitable in low-lying districts, where trenches can not be kept dry.

Cages can be made as follows (see fig. 8 and pl. 6):

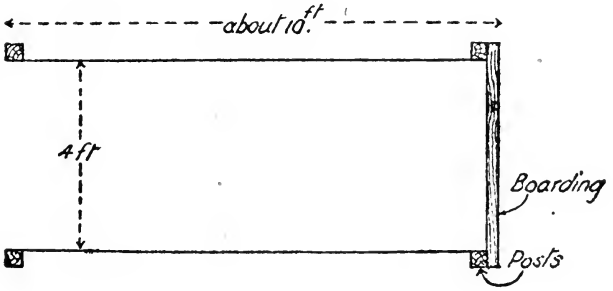
(*a*) *Throwing cage.*—Consists of four posts, which project 8 feet above the thrower's platform. The sides can be made of wire netting or such other material as may be available. The front face should be boarded, the top 1½ feet of which can be removed about

6 inches at a time. The thrower stands inside the cage and throws over the front face, the height of which can be adjusted, according to the proficiency of the thrower, either to a height of 6 feet, 5 feet 6 inches, 5 feet, or 4 feet 6 inches by removing one or more boards. During wet weather a trench board, upon which the thrower can stand, can be placed inside the cage.

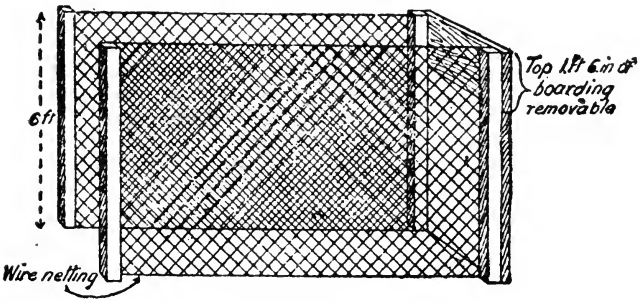
THROWING CAGE.

Fig. 8.

Plan.



Perspective elevation.



(*b*) *Target cage.*—The target cages are similar to the thrower's cage, but the front face need not be boarded, nor need the sides be more than 3 feet high. This cage can be made of any length and traverses placed in it at any interval as desired. The most elementary cage

would be placed in direct prolongation of the thrower's cage. By placing others at different angles the bomber can be practiced at throwing at different angles as his proficiency increases. These cages are of particular value in elementary instruction, as the thrower after completing his practice can see the result of his throwing.

Instruction should also be given in indirect fire, one man observing, the other throwing. The observer, using a periscope or direct observation, corrects the thrower's aim by calling out after each dummy grenade is thrown, "Shorten six yards," "Two yards more right," etc.[1]

As soon as a good standard of accuracy has been reached the men should be formed into squads and instructed in trench work. As this instruction is the most important part of a bomber's training, it should be progressive and carefully thought out, the practice being conducted at first in slow time as a drill in which all detail is explained and all faults corrected. The practice should be gradually quickened up and the party allowed to work by themselves, the practice being criticized on its conclusion. The importance of all members of a squad being equally conversant with the duties of all numbers must be remembered, and the numbers changed round accordingly. A plentiful supply of dummy grenades must be available on all occasions when trench work is practiced.

B. Advanced Course.

The following subjects should be included:

Lectures.—(*a*) Details of grenades of various types, including the German.

(*b*) Details of rifle grenades and throwers.

(*c*) Organization and tactics of bombers in attack and defense, organization for raids or large attack. Cooperation of machine and Lewis guns, tactical use of rifle grenades and throwers.

(*d*) Supply of grenades in an attack.

Practical.—(*a*) Improvement of accuracy and length of throwing hand grenades.

(*b*) Use of rifle grenades, rifle-grenade stands, and throwers.

(*c*) Various practices in attack and defense.

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[1] The following method of direction should always be used by the observer: "— yards front (half right, half left)" (to give thrower the distance and direction of target).

After a throw: "— yards more right (left)" (to correct direction); or "Lengthen — yards" (to correct distance); or "Shorten — yards" (to correct distance); or "Repeat" (if grenade has fallen in right place).

(*d*) Practice in rapid and continuous throwing.
(*e*) Throwing at night with live grenades.
(*f*) Methods of "blocking" a trench.

Great stress must be laid on throwing discipline. One well-placed grenade is worth any amount of grenades thrown indiscriminately.

USE OF MILLS RIFLE GRENADE, NO. 23.

The Mills rifle grenade (No. 23) is a short-range grenade. It is principally designed for use in support of hand-grenade bombers or riflemen in an attack on trenches.

The range that can be obtained increases with the length of the rod.

With a 6-inch rod the maximum range (at an angle of 45°) is approximately 90 yards.

Rifle bombers armed with the grenade are included in a bombing squad, and therefore all bombers must be trained in their use.

Throughout the attack the rifle bombers will keep in close touch with the squad leader in order to—

(*a*) Cover the advance of the bayonet men and throwers, and protect the flanks.
(*b*) Clear hostile blocks, arrow heads, and side trenches which are out of range of hand bombers.
(*c*) Prevent the enemy from sending up reinforcements and hinder his bomb supply.

DIRECTIONS FOR FIRING.

From the rifle with fixed bayonet and special cup attachment (see pl. E):

(*a*) Place the rod of the grenade into the bore and allow the grenade to slide down until the base plug rests on the bottom of the cup, the lever being on the opposite side of the cup to the bayonet.
(*b*) Insert cartridge.
(*c*) Turn safety catch of the rifle to the rear.
(*d*) Pull out the pin of the grenade.
(*e*) Turn the safety catch of the rifle to the front.
(*f*) Hold the rifle at the required angle and fire.

The rifle can be fired from three positions (see pls. 7–10A), viz:
Kneeling with the butt on the ground.
Standing with the rifle in the "on guard" position.
Standing firing from the shoulder.

When firing with the rifle in the "on guard" position, care must be taken that the rifle is clear of the hip (see pls. 8 and 8A).

The position should be chosen to suit the cover available. When firing standing, the bayonet should not show above the cover.

STANDARD TESTS.

1. *First test* (*with dummies*).—To test accuracy of direction, length of throw, and endurance:

Position: Standing in a trench or cage 4 feet wide and throwing over a traverse 6 feet high. The bomber is allowed to jump up to get his direction before throwing, but no mark indicating direction may be used.

Targets (see fig. 9): (*a*) Cage (or trench) directly in prolongation of the throwing cage. Height of cage 3 feet, width 4 feet, length at least 30 feet; distance of thrower's traverse to enemy's traverse 25 yards.

(*b*) and (*c*). Two cages (or trenches) set at an angle of 45° to the thrower's cage; same dimensions as for (*a*), but the distance to the enemy's traverse to be 20 yards.

Number of grenades (dummies), 15: The bomber starts by throwing into cage (*a*). As soon as he has got 3 into the cage, he goes on to cage (*b*) with the balance of the 15 grenades unused; as soon as he has got 3 into cage (*b*), he goes on to cage (*c*) and can expend the balance on getting 2 into cage (*c*). If the number of grenades is expended before 2 grenades have been thrown into cage (*c*), the bomber fails to qualify. This test is all one test and must be carried through continuously. It will not be divided into three separate tests.

2. *Second test* (*live grenades*).—Three live grenades to be thrown at a target, the officer conducting the test to decide on the man's capability.

3. *Third test.*—Rifle grenade (No. 23). Dummy grenades will be used:

Target: A cage (or trench) 20 yards long and 4 feet broad, into which the granades are to drop.

Distance: About 70 to 90 yards.

Standard: Five grenades to be fired, of which 3 are to pitch inside the target.

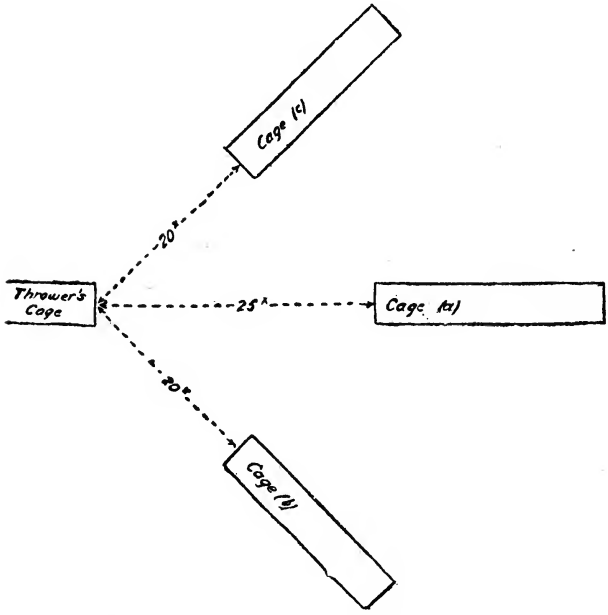
Position: Behind a traverse as in 1. The firer may hold and fire the rifle as desired, so long as his bayonet does not show above the cover.

4. *Fourth test* (*trench tactics*).—Bombers to be tested by working down a trench or such other exercise as the officer conducting the test considers fit. To insure that each man knows the duties of each number in a squad, numbers should be changed round. Questions can be asked as desired.

5. *Fifth test.*—The officer conducting the test will ask questions to ascertain that the bomber understands the mechanism and objects

Arrangement of Cages for Standard Tests.

Fig. 9.



of all types of granades in use, including smoke grenades and candles. He should also be asked questions on German grenades.

The tests will be carried out in the order named above, except that, if more convenient, test No. 5 may be taken before No. 4.

These tests must be strictly carried out and will not be conducted by an officer holding an appointment junior to brigade bombing officer.

Only noncommissioned officers and men who pass the above tests will be classified as trained bombers and be entitled to wear the distintive bomber's badge.[1]

A man must qualify in each test and must not go on to the next until he has qualified in the previous one.

Dress for first, second, and third tests.—Drill order with haversack, water bottle, and entrenching implement, but without rifle. (See pls. 5, 5A.)

1. PHYSICAL EXERCISES FOR BOMBERS.

A. Introductory Exercises.

1. Leg exercise: *Head forward. Heels raising and knees bending (four times).

2. Neck exercise: Head turning quickly (3 times in each direction).

3. Arm exercise: *(*a*) Arms swinging sideways and upward (six times). *(*b*) Arms sidewise stretch. Arms swinging forward (four times). Hands to be turned palms facing during the movements (*a*) and (*b*).

4. Trunk exercise: *Feet astride. Arms side stretch. Trunk bending sideways quickly (three times in each direction).

5. Lunging exercise: *Head forward, feet full outward. Lunging outward (three times each foot).

B. General Exercises.

1. Prep. for feet astride. Arms upward stretch: Trunk bending backward (three times). Spring back. Comp. exercise feet astride. Head forward: Trunk bending forward and full downward (twice).

2. Balancing exercise: Head forward. Leg raising forward, sideways, and backward (3 times each leg).

3. Lat. exercise: *(*a*) Head forward, feet outward place, trunk to the left (right) turn. Trunk bending sideways (three times each side). (Note.—Trunk always to be turned and bent toward the rear foot. *(*b*) Arms bending, feet sideways place: Trunk turning quickly, with arms stretching upward (three times in each direction).

4. Abdomen exercise: (*a*) On the hands—Arms bending (up to three times). Add later "with leg raising."

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[1] All badges previously awarded will continue to be worn.

* Starred (*) exercises indicate that these are specially adapted for developing the muscles used in bomb throwing.

5. Dorsal exercise: Arms bending, F. sidewise placed, trunk forward bending—Arms stretching sidewise. Later, arms stretching upward.

Or Feet astride. Arms upward stretching, trunk forward bending. Arms swinging downward and backward.

6. Marching exercise: Quick march. Double march.[1] Marching on the toes. To be done each time.

* Quick sprints.

Relay race,[2] or a short sharp game to develop speed and wind. (Only for a few minutes, but with energy and dash.)

7. Jumping and vaulting exercise:

*(*a*) Upward jumping, with arms swinging sideways and upward.

*(*b*) Upward jumping, with arms swinging upward.

(*c*) Running forward and jumping high and long jumps off a mark, with rifles and fixed bayonets.

(*d*) Vaulting over beams, walls, etc., as available.

(*e*) Jumping into and getting out of shallow and deep trenches.

N. B.—Only one or two of the above exercises daily, according to time available, until the men are proficient. When proficient they can be run over an obstacle course, which should include obstacles that will cause them to put into practice all they have been taught hitherto, but in a more practical form.

C. Final Exercises.

1. Leg exercise: Heel raise (four times).

2. Trunk exercise, head forward: Trunk turning (twice in each direction).

3. Correction exercise: Arms raising forward and upward, lowering sidewise and downward (until the action of the heart and lungs is eased).

Note.—Quickening exercises, for the purpose of relieving monotony and instilling dash, should be introduced here and there during the table.

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[1] This should not be done in the ordinary double time; but, in order that the men may learn to make full use of their legs in getting over the ground, every attention should be paid to developing a long springy stride on the toes.

[2] Dummy bombs or small sandbags of approximate weight should be carried to accustom men, when moving rapidly, to pass bombs to each other without dropping them.

* Starred (*) exercises indicate that these are specially adapted for developing the muscles used in bomb throwing.

II. Throwing Practice.

In order to utilize the throwing muscles, developed individually by exercises, they must be capable of coordinated action. This is best developed by actual throwing practice.

A convenient and practical method of developing this coordination of the throwing muscles is by means of "medicine" bag practice.

A "medicine" bag can be made of strong canvas filled loosely with sand (damped before using), dried peas, beans, etc., in weight about 2 pounds.

This practice is carried out by two men, standing from 8 to 12 paces apart, throwing the bag from one to the other. The bag must be thrown or bowled with the correct bomb-throwing action, slowly and deliberately, so that each muscle is brought into use. The thrower must endeavor to make a "good shot" with the bag and throw it into the opposite man's hands, which should be held close up against the chest, open and ready to catch the bag. The bag is caught and thrown or bowled back in the same manner.

The practice should cease as soon as the throwers feel the strain and commence to lose the correct throwing positions; the practice throughout must never be hurried.

This training can be carried out by big classes, and in a room as well as in the open. Not only are the throwing muscles trained and the length of throw increased, but good direction and alertness are developed.

METHOD OF USING THE RIFLE AND BAYONET WHEN ATTACKING ROUND A TRAVERSE.

1. Only men specially skilled with the bayonet should be selected as "bayonet men" with bombing squads. They must act as scouts as well as protectors to the bombers.

2. (1) When making an attack round left traverse (fig. 10A and fig. 11).

The rifle is held at what may be described as the "low port," i. e., slanting across the body, the bayonet pointing upward and close to the left shoulder; the left hand close to the left breast and grasping the rifle just behind the piling swivel; the right hand just behind the back sight.

Left foot forward, and the weight of the body poised for an immediate dash round the traverse with the right foot, at the same time as the bayonet is swung down to deliver a "point."

(2) For an attack round a right traverse—vice versa.

3. (1) When working round a left traverse to make an attack on any enemy low down on the ground, in a "dug-out," etc. (fig. 12).

The rifle point downward, the small of the butt passi g under the right armpit, the point of the bayonet just off the ground; the right

Fig. 10.—ATTACKING ROUND A LEFT TRAVERSE. (Back view.)

Fig. 11.—ATTACKING ROUND A LEFT TRAVERSE. (Front view.)

hand grasping the rifle just behind the back sight, left hand just below the piling swivel; the left foot forward, and the weight of the body distributed ready to make an immediate dash round the traverse and to deliver a point.

(2) For an attack round a right traverse, vice versa.

4. When moving along trenches in file (except the leading man) (Fig. 10B):

The rifle held close up against the right side with the finger through the trigger guard—i. e., the old "short shoulder."

The leading man should carry his rifle in the position of immediate readiness described in 2 (i)—viz, the "low port." (Note.—In these positions the rifles do not protrude beyond the traverse, nor show above the trench.)

Fig. 12.

Attacking round a left traverse, rifle held ready to make a downward point with the bayonet.

5. Instructions to be observed by "bayonet men":

(1) Never go round a corner without being on the alert.

(2) Learn to use the bayonet with skill when the rifle is gripped behind the backsight with either the left or the right hand.

(3) Become an adept in all "knock-out" methods with the rifle, etc., and be able to make a "point" even when lying on the ground.

(4) For night work the bayonet should be dulled.

APPENDIX II.

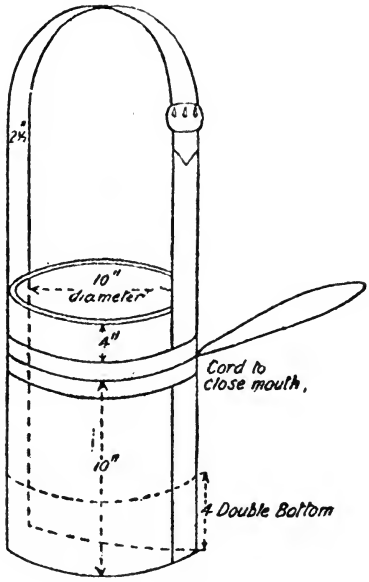
GRENADE CARRIERS.

The following patterns of grenade carriers have been found generally useful:

(*a*) *Bucket carrier* (fig. 13).—This is a canvas bucket with double bottom. It is carried by a sling of adjustable length, and will hold 20 Mills grenades. It is closed by a cord.

A very efficient bucket carrier can be made from an ordinary sandbag, doubled over at the top, with a side and bottom stiffening of wire petting and a rope handle.

Fig. 13.



Care should be taken that the safety-pins are not bent when grenades are carried in a bucket.

(*b*) *Belt bag carrier.*—A canvas bag with steel hook, to be carried on waist belt and hold four Mills grenades. The bag is closed by a piece of string. Various other types are in use.

(*c*) Waistcoat pattern, with pockets, to carry 10 Mills grenades.

APPENDIX III.

DESCRIPTION OF BRITISH GRENADES AND INSTRUCTIONS FOR THEIR USE.

A. The following types of grenades are now in use: Mills grenade, grenade, hand, No. 5; Hales rifle grenade (with wind vane), grenade, rifle, No. 3; Hales rifle grenade (vaneless), grenade, rifle, No. 20; Mills grenade to be fired from rifle, grenade, No. 23.

B. The following grenades should be available shortly: Pippin rifle grenade, grenade, rifle, No. 22; Hales rifle grenade (vaneless improved), grenade, rifle, No. 24.

In the descriptions which follow the grenades are arranged in order of their numbers. A description of the P grenade is given after No. 24.

HALES RIFLE GRENADE, SHORT RIFLE, NO. 3, MARK I (PERCUSSION).

[Weight complete, 1 pound 5 ounces. Mean maximum range, 185 yards.]

DESCRIPTION.

(See Pl. B, fig. 1.)

Body.—Serrated steel, filled with explosives. Down the center of the explosive is a brass tube into the forward end of which the detonator is inserted. The body is closed by the base piece. This carries the striker pellet, two retaining bolts, wind vane, releasing socket, and safety pin. To the base piece is fixed a base plug carrying the spring clip and a 10-inch steel rod.

Detonator holder (*see pl. F, fig. 3*).—Consists of a special brass tube which screws into the head of the grenade. It is 2½ inches long and contains a detonator and detonator cap. Until the detonator is inserted the head of the grenade is closed by an ebonite screw plug.

Cartridge.—A special blank cartridge is supplied to fire the grenade.

Action.—The action of the grenade on being fired is as follows: The wind vane revolves as the grenade travels through the air; after a few turns of the vane the retaining bolts are no longer held in position by its inner surface and fall out; on impact the striker pellet sets

forward against the creep spring onto the detonator cap, thus firing the grenade.

This grenade is very safe to handle, as it can not be fired by knocking or dropping on the ground; it must travel through the air some distance before the retaining bolts fall out.

INSTRUCTIONS.

To prepare for use:

1. Holding the grenade head down so as to make certain that the needle is not free, remove the ebonite screw plug.
2. If correct, screw in the detonator holder.

To fire:

1. Lower the rod into the barrel of the rifle, and clip over the muzzle.
2. Load the rifle with the special blank cartridge.
3. Immediately before firing withdraw the safety pin.

If, after the safety pin has been removed, the grenade is not used, the safety pin may be replaced if the wind vane has not unscrewed and uncovered the two retaining bolts; but if these are uncovered the grenade is in a dangerously sensitive condition, and if so found should be destroyed.

Special precautions to be adopted when firing No. 3 rifle grenade (either with or without pin on wind vane):

1. The grenade should be tapped on the palm of the hand before inserting the detonator, to insure that the striker pellet is properly held in place by the retaining bolts.
2. The wind vane and the releasing socket must not be tampered with.
3. The safety pin must not be removed before the grenade has been inserted in the rifle.
4. The detonator holders of No. 2 and No. 3 grenades are of slightly different lengths, but otherwise very similar (see Pl. F, figs. 2 and 3). Care should be taken not to mix them up. A No. 2 detonator holder in a No. 3 grenade would probably cause a blind; the correct detonator holders are supplied in the grenade box.
5. *The grenade must not be fired with a cartridge with a bullet in it (ball cartridge), as this may burst the rifle.*
6. The rod should be oiled, but only slightly, before placing it in the barrel of rifle.

Inspection.—The following points should be noticed:

1. That the wind vane is covering the retaining bolts.
2. That the releasing socket and safety pin are correctly in place.

3. That the striker pellet is held correctly by the retaining bolts, which fit into a groove in it and should prevent it from moving.

4. That the creep spring is in position over the striker pellet.

5. That the screw thread and cavity for the detonator holder are clean and clear.

6. That the rod is straight and clean.

7. That the metal at the lower end of the detonator holder is correctly turned in over the detonator cap, so that the latter is securely held. If it is not, the cap may come out on the shock of discharge, strike the needle, and so cause a premature.

Packing.—The wooden box provided contains 12 grenades, 12 "detonators, rifle grenades" (which are detonator holders complete with detonators), and 12 special blank cartridges in a tin box.

GRENADE, HAND, NO. 5, MARK I, OR MILLS' HAND GRENADE (TIME).

[Weight complete, 1 pound 6½ ounces.]

DESCRIPTION (*see Pl. B, fig. 2*).

Body.—Cast iron, serated to provide numerous missiles on detonation. Into one end is screwed a center piece with separate recesses for the striker and the detonator.

The striker is kept cocked against its spring by its head catching on the end of the striker lever when the latter is lying against the body of the grenade.

The lever is retained in this position by the safety pin.

Igniter (see Pl. F, fig. 4).—This is a separate unit, consisting of cap, cap chamber, safety fuse, and detonator (No. 6, which is 1⅜ inches long, No. 8 being 2⅛ inches). (See Pl. F, figs. 7 and 8.)

On withdrawal of the safety pin, the lever swings outward under the pull of the striker spring, thus releasing the striker which fires the cap. The safety fuse burns about five seconds and then fires the detonator.

INSTRUCTIONS.

To prepare for use:

1. Examine the safety pin and see that it is easy to withdraw.

2. Unscrew the base plug and insert igniter.

3. Screw in the base plug with the key provided, taking care that it is screwed home. The lead base plugs which are sometimes supplied must be screwed in with care, otherwise the projections may be injured.

To throw:

1. Hold the grenade in the right hand in such a position that the lever is held securely against the body of the grenade by the fingers, with the lever along the second joints of the fingers.

2. Withdraw the safety pin with the left hand, using a hook if preferred, still keeping a firm grip on the lever.

3. Throw the grenade.

Special precautions:

1. Do not release the lever before throwing the grenade.

2. It is essential that the lever should be held securely against the body of the grenade, otherwise the collar which holds back the striker may release it and so ignite the fuse.

3. The precautions against using grenades as filled grenades after they have been used as dummies for practice is particularly applicable to this type.

4. Before inserting igniter see that the safety pin is not broken or badly corroded, and that the fuse is not cracked or damaged, as these defects may accelerate time of burning.

Inspection.—The following points should be noticed:

1. That there are two striking points on the perimeter of the lower end of the striker, and not one central point. A central point as used in Stokes's mortar bombs will cause a premature explosion in a Mills grenade.

2. That the safety split pin is not broken or badly corroded and that the ends are correctly splayed, so that the pin can not be jolted out, but yet is not too difficult to withdraw.

3. That the jaws of the lever are a good fit and hold the top of the striker correctly.

4. That the wax seal around the top of the striker is unbroken.

5. That the mouth of the detonator is closely crimped around the safety fuse, so that no flash can enter the detonator except through the fuse.

6. That the fuse is in good condition and not cracked or damaged by being bent, and is not loose in the cap.

It has been found by experiment that no danger attaches to the partition between the recesses for the striker and the detonator being thin or holed. Even with the partition completely cut away no prematures have taken place.

Mills's grenades for use as rifle grenades must have solid, and not recessed, base plugs.

Packing.—The grenades are packed 12 in a wooden box, with a cylinder containing 12 igniters.

VANELESS RIFLE GRENADE, NO. 20.

[Weight complete, 1 pound 6 ounces. Mean maximum range, 250 yards.]

DESCRIPTION (*see Pl. C*).

This grenade is an improved form of No. 3 without the wind vane and spring clip. The safety pin is below the releasing collar.

Body.—Serrated steel filled with explosive. Down the center of the explosive is a brass tube, into the forward end of which the detonator is inserted. The body is closed by the base piece. This carries the striker pellet, two retaining bolts, releasing socket, and safety pin. To the base piece is fixed a 10-inch steel rod.

Detonator holder (*see Pl. F, fig. 3*).—Consists of a special brass tube which screws into the head of the grenade. It contains a detonator and detonator cap. Until the detonator holder is inserted the head of the grenade is closed by an ebonite screw plug.

Cartridge.—A special blank cartridge is supplied to fire the grenade.

Action.—On the shock of discharge, the releasing socket sets back; the retaining bolts are no longer held in position by its inner surface, and fall out. On impact the striker pellet sets forward against the creep spring onto the detonator cap, thus firing the grenade.

INSTRUCTIONS.

To prepare for use:

1. Holding the grenade head downward, remove the ebonite screw plug, and tap the grenade on the hand, so as to make certain that the striker is not free.
2. If correct, screw in the detonator holder.

To fire:

1. Lower the rod into the barrel of the rifle.
2. Load the rifle with the special cartridge.
3. Immediately before firing withdraw the safety pin. If the grenade is not fired the safety pin may be replaced.

Special precautions:

1. The grenade should be tapped on the palm of the hand before inserting the detonator holder, to insure that the striker pellet is properly held in place by the retaining bolts.
2. The releasing socket must not be tampered with.
3. After withdrawing the safety pin it should be noticed that the releasing socket is still in its right position; it may slip back (thus releasing the retaining bolts) if it has not been properly secured over the retaining rim during manufacture. *A grenade in this*

condition is dangerous, and would probably explode prematurely at the muzzle.

4. The safety pin must not be withdrawn before the grenade has been inserted in the rifle.

5. *The grenade must not be fired with a cartridge with a bullet in it (ball cartridge), as this may burst the rifle.*

6. The rod should be oiled, but only slightly, before placing it in the barrel.

7. The detonator holders for grenades No. 2 and No. 20 (*see* pl. F, figs. 2 and 3) are of slightly different lengths, but otherwise very similar. Care should be taken not to mix them up; a No. 2 detonator holder in a No. 20 grenade would probably lead to a blind. The correct detonator holders complete with detonators are supplied in the grenade box.

Inspection.—The following points should be noticed:

1. That the releasing socket and safety pin are correctly in place.

2. That the striker pellet is correctly held by the retaining bolts, which fit into a groove in it and should prevent it from moving.

3. That the creep spring is in position over the striker pellet.

4. That the screw thread and cavity for the detonator are clean and clear.

5. That the rod is straight and clean.

6. That the metal at the lower end of the detonator tube is correctly turned in over the detonator cap, so that the latter is securely held. If it is not, the cap may come out on the shock of discharge, strike the needle and so cause a premature.

Packing.—The wooden box provided contains 12 grenades, 12 detonator holders (containing detonators) in a tin box, and 12 special blank cartridges in a tin box.

PIPPIN RIFLE GRENADE, No. 22, MARK I.[1]

[Weight complete, 1 pound 9¼ ounces. Mean maximum range, 300 yards. This is a modification of the extemporized "Newton" grenade.

Description (See pl. D).

Body.—The grenade consists of a cast-iron, stream-line body with a flat head, serrated on the outside. A 15-inch rod is screwed into the pointed end and fitted with a copper gas check. In the center of the flat head is a hole; into this, after the grenade has been filled

[1] The final pattern of No. 22 is not yet definitely settled, and the description given here may require modification later.

with ammonal, a paper tube with a solid end is forced down and waxed in. This tube takes the special detonator.

Cap.—Over the head of the grenade is a detachable pressed steel cap, the sides of which have been cut away, leaving four projecting lugs, each with a formed hole in it. These lugs fit over four projections cast on the body. The cap is fitted with a safety pin.

Detonator holder (See Pl. F, fig. 5).—Consists of an ordinary .303 rifle cartridge case before undergoing the operation of necking, fitted with a percussion cap only. Inside is an ordinary No. 8 detonator packed round with waxed paper, with the end spun over. A tin safety strip is fitted to the base of the cartridge case which covers the cap; this must be perforated by the striker before it can reach the cap.

Action.—The grenade, owing to the rod, falls on its head. On coming in contact with the ground the steel cap is driven up and forces the striker through the safety strip into the cap of the cartridge.

INSTRUCTIONS.

To prepare for use:

1. Remove the steel cap by the lever supplied with each box of grenades.
2. Push the detonator holder down into the grenade until the rim of the cartridge case comes in contact with the body.
3. Replace the steel cap.

NOTE.—The safety pin must not be removed during the above operations.

To fire:

1. Lower the rod into the barrel of the rifle.
2. Load the rifle with the special cartridge.
3. Immediately before firing, withdraw the safety pin.

Special precautions:

1. The safety pin must not be removed before the grenade has been inserted in the rifle.
2. The grenade must not be fired with a cartridge with a bullet in it (ball cartridge), as this may burst the rifle.
3. Only the special detonator holders and cartridges provided must be used.
4. The rod should be oiled, but only slightly, before placing it in barrel of rifle.
5. Owing to the grenade being armed as soon as the safety pin has been removed it is advisable to fire it from behind cover.

Packing.—The wooden box provided contains 12 grenades, 12 detonator holders with detonators in a tin box, and 12 rifle grenade cartridges in another tin box.

MILLS' RIFLE GRENADE, NO. 23, MARK I.

[Weight, complete, 1 pound 8½ ounces; mean maximum range (with 6-inch rod), 90 yards.]

DESCRIPTION.

(See Pl. E).

Body.—This is a No. 5 (Mills) grenade with a short rod, 5½–6 inches long, screwed into the base plug of the grenade. The hole in the base plug is filled with wax or luting when issued, in order to keep the grenade damp-proof in case the rod is not required.

Cartridge.—A special blank cartridge is supplied to fire the grenade.

Ring attachment.—In order to keep the lever of the grenade in place after the safety pin has been removed previous to firing, a ring attachment is fixed to the rifle by means of the bayonet; it is so constructed that it can be used either with the long or short bayonet.

This attachment can not be used with the long rifle (owing to the lack of space between the bayonet and the bore of the rifle). A special attachment is necessary in this case to take the place of the bayonet.

Action.—When the grenade is shot out of the rifle the lever is no longer held down by the ring attachment and the normal (Mills) grenade action follows.

With a 5½-inch rod the maximum range is 80 yards with the rifle at an elevation of 45°.

Variation of range is obtained by altering the elevation of the rifle. The rifle may be fired from the shoulder or hip, as there is very little recoil.

The grenade without the rod can be used as a hand grenade.

INSTRUCTIONS.

To prepare for use:

1. Unscrew the base plug and insert the igniter.
2. Screw in the base plug with the key provided, taking care that it is screwed home.
3. When required as a rifle grenade, screw in the short rod.

To fire:

1. Fix the ring attachment to the bayonet.
2. Fix the bayonet.

3. Lower the rod into the rifle until the grenade is within the ring attachment and the lever is held by the ring.

4. Load the rifle with the special cartridge.

5. Immediately before firing, withdraw the safety pin.

Special precautions:

1. When inserting the igniter see that the fuze is not cracked or damaged, as this may accelerate time of burning.

2. The lever must be held securely by the ring against the body of the grenade.

3. The safety pin must not be withdrawn before the grenade is inserted in the ring attachment.

4. The grenade must not be fired with a cartridge with a bullet in it (ball cartridge), as this may burst the rifle.

5. The rod should be oiled, but only slightly, before placing it in the barrel.

6. The rod must be firmly screwed in.

Inspection.—In addition to the points noticed under No. 5 (Mills) grenade:

1. Only grenades with solid base plugs should be used for rifle grenades, as otherwise the rod is liable to break the plug and cause a premature.

2. The hole in the base plug should be filled with wax or luting.

Packing.—The wooden box provided contains 12 grenades, 12 igniter sets, 12 rods, and 12 cartridges.

HALES RIFLE GRENADE (VANELESS IMPROVED), No. 24, MARK I.

Description.—This grenade is a modified form of No. 20, from which it differs in the following particulars:

(*a*) The exterior of the body is serrated in horizontal rings only; there are no longitudinal serrations.

(*b*) The releasing socket is 1 inch long, instead of $1\frac{3}{4}$ inches, and the brass base is correspondingly shorter. The lower end of the brass base is not belled, so that the socket drops off about 10 yards from the rifle.

(*c*) The detonator container is 2 inches long, instead of $2\frac{3}{4}$ inches, and its milled top is a sleeve, instead of turned out of the solid.

(*d*) The striker is one-half inch shorter and the needle point is blunt.

(*e*) The tube up the center of the body is shortened so that only the end of the detonator container engages in it, whereas in No. 20 the tube comes right up to the top of the body.

The action and instructions are the same as for No. 20.

PIPPIN GRENADE.

[Weight complete, 1 pound, 8 ounces.]

Description.—The bomb consists of a tin cylinder 3 inches in diameter and 5 inches long. In one end is soldered a detonator tube and a short length of copper wire for binding purposes. The cylinder is filled with red phosphorus.

The bomb when exploded produces a thick white smoke; the phosphorus thrown out causes burns, and may cause fires.

The detonator supplied is the ordinary No. 8, fitted with 9 seconds fuze and Brock lighter.

INSTRUCTIONS.

To prepare for use: Insert the detonator in the detonator tube and bind in place with the copper wire.

To fire: Tear off the tape from Brock lighter and rub black blob of composition so exposed with the brassard supplied.

Precautions: Wherever stored, the grenades should be examined from time to time to see that the tins have not become corroded or rusted through into holes, as there is a danger of fire when the phosphorus is exposed to the atmosphere.

Packing: The grenades are packed 12 in a box, which also contains a tin of 12 detonators, fuses and fuse lighters, and two brassards.

APPENDIX IV.

DESCRIPTION OF GERMAN GRENADES AND INSTRUCTIONS FOR THEIR USE.

GENERAL REMARKS.

Descriptions of certain German grenades are given below. The first, third, and fourth are most commonly found, and are alone mentioned in documents recently captured. The last, the hairbrush (improvised hand grenade), was described in textbooks issued before the war.

1. Cylindrical hand grenade with handle (time fuse).
2. Cylindrical hand grenade with handle (percussion).
3. Egg hand grenade.
4. Rifle grenade, 1914.
5. Rifle grenade, 1913.
6. Disk hand grenade.
7. Spherical hand grenade.
8. Parachute grenade.
9. Small tin hand grenade.
10. Cylindrical hand grenade with spring igniter.
11. Hairbrush hand grenade with spring igniter.

German hand grenades which have been found are of two types: Those which have the appearance of service articles and those which are obviously improvised. With the latter, great care is invariably taken to protect the charge from damp, and to render it flashproof by waxing., etc.

The hand grenades are both time and percussion. With the former, the time of burning is about 6 seconds, and the fuse is ignited by one of the following methods:

1. Spring striker and cap. (See pl. P., figs. 1 and 2, and pl. Q.)
2. Friction tube. (See pls. G, J, and N.)
3. Match-head lighter. (See pl. P, fig. 3.)

Attached to fuse and detonator.

The following precautions should be taken with any grenades that may be found or captured:

1. The grenades should be examined at once by a bomber, in order to find out whether they are live, how they are fired, etc.

2. The means of firing will probably be immediately apparent to a trained bomber, but during examination grenades should ne handled with care.

3. No man who does not understand grenades should touch them, but should report the presence of a store of grenades to the nearest bomber, N. C. O. or officer.

4. When used against the enemy, a grenade should be thrown as soon as it is "lit," even if there is no apparent evidence of the fuse burning.

5. Arrangements for removing, storing, or destroying grenades found in a captured position should be made as soon as possible by bombing officers.

6. Bombing officers will also be responsible that, when samples of grenades are taken back to headquarters for examination, the grenades are not in a dangerous condition, and the detonators have been removed.

1. CYLINDRICAL HAND GRENADE WITH HANDLE AND TIME FUSE, REGULATION TYPE.

STIELHANDGRANATE B.Z.[1]

[Weight, 1 pound 13 ounces.]

DESCRIPTION.

(See Pl. G, figs. 1 and 2.)

Body.—Tin cylinder, 4 inches by 2⅞ inches diameter, containing a cartridge of explosive. The full charge is 300 gr. (10.5 oz.), but part of the space is sometimes filled by a wooden block.

The top is closed by a lid held in place by four clips; at the bottom there is a screw-threaded hole to take the handle. The bottom of the cartridge is fitted with a paper tube for the detonator. On the side of the body there is a hook, by means of which the grenade can be attached to the belt.

The inscription on the body, "Vor Gebrauch Sprengkapsel einsetzen" means "Before use insert the detonator."

Handle.—Wooden, about 9 inches long, with a metal top screwed to fit the body. It is bored axially to take the igniter and wire pull. In the latest pattern a screwed metal cap is fitted to the end, which protects the string loop attached to the wire pull (*fig. 3, Pl. G*).

[1] Generally known as the "jampot and stick" grenade.

Method of ignition.—The means of ignition consist of a friction lighter and safety fuse, contained in a cardboard tube. The igniter is actuated by pulling a string loop at the end of the handle. This loop is attached to the wire pull of the friction tube. In the old pattern the string loop is fixed to the handle by means of a paper band, but in the new pattern a porcelain button is attached to the loop in order to afford a better grip; a hollow is formed in the end of the handle and covered by means of a screwed metal or cardboard cover. When issued the string loop and button are coiled up in the hollow and are protected by the cover. The mouth of the detonator fits into a brass tube at the top of the igniter, and is fired by the flash from a dab of phosphorus at the end of the safety fuse. Time of burning, $5\frac{1}{2}$ or 7 seconds, as marked on the handle.

Safety arrangements:

1. The grenade and detonator are kept separate during carriage.
2. The string loop is either attached to the handle by a paper band or contained in a metal or cardboard cover. The paper band or the cover should only be removed just before firing.

INSTRUCTIONS.

To prepare for use:

1. Unscrew the handle and see if the detonator is in position; if it is, refix the handle.
2. Hold the grenade in the right hand.
3. Tear off the paper band with left hand or unscrew the metal cover, or remove cardboard cover, as the case may be.
4. Pull loop or button with left hand.
5. Throw immediately.

If the detonator is not in position, search should be made for a supply of the proper detonators. Fit the mouth of the detonator into the projecting brass tube, screw in the handle, and then proceed as in 2, 3, 4, and 5 above.

To render useless:

1. Unscrew handle, remove detonator.
2. Pull string loop, which will light the fuse, and throw handle away.

[Note.—The red grenade found in some boxes is a dummy without fuse, detonator, or exploder.]

2. CYLINDRICAL HAND GRENADE WITH HANDLE (PERCUSSION), REGULATION TYPE.

Stiel or "Wilhelm's" Handgranate, Az.[1]

[Weight, 1 pound 12 ounces or 1 pound 5 ounces.

DESCRIPTION.

(see Pl. H.)

This grenade is similar in general outward appearance to the "jampot and stick" grenade (time fuse), just described. The differences are:

1. The end of the handle (see below), which may have a wire loop projecting from it.
2. The diameter of the cylinder is 1 inch greater than that of the time-fuse pattern.
3. It has no hook on the side of the cylinder.

Body.—Tin cylinder, 4 inches long (marked 6.2 inches in one drawing, though it only scales 4 inches) by $3\frac{7}{8}$ inches in diameter. It contains a cartridge of 7 oz. according to one account, 15.8 oz. according to another, of explosive. The top is closed by a lid; at the bottom there is a screw-threaded hole to take the handle. The bottom of the cartridge is recessed and lined with cardboard to receive the detonator, etc.

Handle.—Partly metal and partly wood, about 9 inches long. The metal top contains the firing arrangements and is screwed to fit the body. The wooden part is bored axially to take the safety pin. In one description the loop of the wire safety pin projects from the end of the handle; in the other there is a weight attached to the end of the pin which is secured in a metal screw cap on the end of the handle.

Action.—This is not quite clear from the plate. It is described as follows: The firing arrangement consists of a striker and a safety device. On throwing, the safety pin is withdrawn by the weight flying out in one pattern, by hand in the other; the spring cover then flies off and withdraws the safety wire from the striker bolt, which is then only held by the ball and the flat spring. On striking the ground, the ball and flat spring fall out from their seatings;

[1] Two official descriptions of this grenade were among the documents captured in August, 1916; but no specimen of it has been received at G. H. Q. The two descriptions vary slightly as regards the method of removing the safety pin and the amount of explosive.

the striker bolt is therefore free, and is driven by its spring on to the cap.

Safety arrangements:

1. The grenade and detonator are kept separate during carriage.
2. Safety pin and safety wire (as described under "Action").
3. Cord which holds safety pin (or cap which keeps the weight secured).

INSTRUCTIONS.

To prepare for use:

1. Unscrew the handle and remove filling from detonator recess.
2. Insert detonator in its place and replace the handle.

To throw:

1. Remove the safety cord (or unscrew the cap on the end of the handle.
2. If there is a loop at the end of the safety pin (and no weight), place the little finger of the right hand in the loop.
3. Grasp the handle with right hand and throw. The arm must be raised high and as much force as possible used, even if the target is near; otherwise the grenade may not be armed.

To render useless:

If the safety pin has not been pulled out, unscrew handle and remove the detonator.

Care must be taken in throwing not to hit the grenade against anything or it may explode.

As long as the safety pin is in the handle, the grenade is safe to handle and it will not detonate if struck or allowed to fall.

Blinds are extremely dangerous to handle.

3. EGG HAND GRENADE (EIERHANDGRANATE).

[Weight, 11 ounces, but patterns vary slightly.]

Can be thrown about 50 yards.

DESCRIPTION.

(See pl. J.)

Body.—Cast iron, egg-shaped, about 60 mm. (2.3 inches) long by 45 mm. (1.77 inches) diameter, with a screwed hole at one end to receive the igniter. It is filled with a special powder which does not require a detonator.

Method of ignition.—The igniter is a lead alloy tube which screws into the body and contains a fuse; on one end is fitted a metal cap,

containing the friction lighter, which is operated by pulling a wire loop either by hand or by a wrist strap.

Two igniters are supplied—No. 1, with 8 seconds fuse for grenades thrown by mechanical means; No. 2, with 5 seconds fuse for grenades thrown by hand.

Safety arrangements: The igniter is carried separate from the grenade; a small lead plug is screwed into the body and must be removed before the igniter can be inserted.

INSTRUCTIONS.

To prepare for use:

1. Unscrew and remove lead plug.
2. Screw in igniter.

It is important when screwing in the igniter to keep the grenade upright, so that no powder can get into the screw threads.

To throw: Pull the wire loop either by hand or by a wrist strap and throw in the usual way.

To render useless: Unscrew the igniter.

4. RIFLE GRENADE, 1914. PERCUSSION (GEWEHRGRANATE).

[Weight about 2 pounds; maximum mean range, 380 yards.]

DESCRIPTION.

(See pl. K).

Body.—Cast iron, 0.2 inch thick, painted field gray and serrated to give fragments of sufficient size on detonation. The charge ($2\frac{3}{4}$ ounces) is made up in a thin cardboard cylinder, which is retained in the grenade by a shoulder piece screwing on to the body. The nose of the grenade is screw-threaded to take the percussion fuse, and the base to take a nipple for a tin disk and tail rod with gas check. Until the fuse is inserted the nose is protected from dust and damp by a plug and leather washer.

Method of ignition.—The percussion fuse contains an exploding charge with detonater and cap. The last-named is set off by a striker pellet screwed into the socket of the fuse. The needle of the pellet is hinged and lies flat on top of the cap when in the safety position, but is pulled and maintained erect by the spring in the striker pellet as soon as the pellet moves forward after firing.

Safety arrangements:

1. The striker pellet is retained in position by a locking ball, which rests in a recess in the pellet. This ball is prevented from falling out by a locking ring which is held up by a flat spring with curved ends. On the rifle being fired the locking ring overcomes the spring and sets back, and the locking ball is driven out of its recess by the striker pellet, which, acting under the pressure of its spring, moves forward out of the body together with the nose of the fuse. At the same time the needle pellet spring pulls up the needle into the firing position.

2. The striker pellet is prevented by its spring from being driven back onto the cap until impact.

INSTRUCTIONS.

To use:

1. Unscrew plug by means of the key, pull the two-pronged safety pin from the fuse, and screw the fuse in slowly and carefully by means of the key.

2. Lower the grenade carefully into the barrel.

3. Insert special cartridge in the breech.

4. Fix the rifle at the required elevation.

5. Fire the rifle.

To render useless: Unscrew fuse from the grenade.

Precautions:

1. A German rifle, 98 or 88/05 only can be used.

2. Care must be taken that the grenade is not dropped, especially on the tail rod, as then it is liable to become "live," and will therefore detonate on firing. It should be carried head uppermost by the grenade, not by the rod.

3. The special rifle grenade cartridge must be used, and in no case a ball cartridge.

4. Tail rods which jam or rub when being placed in the barrel must not be used, and no force is to be employed.

5. Damp tail rods should be dried before use. All rods should be firmly screwed in.

Warning: Grenades with live fuses should not be fired or touched: They are easily recognizable, as the nose of the fuse will be found sticking out (compare figs. 1 and 2). Grenades in this condition should be destroyed as soon as possible.

5. RIFLE GRENADE, 1913 (PERCUSSION).

[Weight, about 2 pounds complete; charge, 3.2 ounces explosive. Maximum mean range, 350 yards.]

DESCRIPTION.

(See Pl. L.)

Body.—Steel, 4.3 inches long and 0.16 inch thick, is serrated longitudinally and transversely, so that on detonation it may split up into fragments of sufficient size. It is painted gray. The base is closed by a brass base cup, which has screwed into it a steel tail rod 18 inches long, with copper gas check to take the grooves of the rifling. The rod has a thin coating of copper to protect it from rust and also to protect the barrel. A tin disk is fastened to the head of grenade by the igniter plug for short ranges.

Method of ignition.—An igniter plug, carrying cap and detonator, screwed into the head of the grenade. A brass tube passing through the center of the grenade contains a striker pellet, with needle and creep spring.

Safety arrangements:

1. A powder safety device is contained in base cup. Screwed into the striker pellet is a spindle which passes through into the base cup and has at its lower end a small platform with three flash holes. On this rests a pellet of compressed powder, the object of which is to keep the striker from moving forward until a short time after the grenade has left the rifle. This powder is ignited by means of a small brass pellet with a cap, which sets back on the shock of discharge, and, flattening a small spring, is penetrated by a needle on the screw plug closing the base cup. A vent hole in the base cup allows the escape of the gases of combustion. This is normally sealed with wax.

2. When the powder is burned away the striker is only prevented from moving forward by a creep spring, the resistance of which is overcome on strike.

INSTRUCTIONS.

To use:

1. Unscrew zinc plug from the head.
2. Screw in the igniter plug (with tin disk for ranges under 200 yards).
3. Lower the grenade carefully into the barrel.
4. Insert a rifle grenade cartridge in the breech.
5. Fix the rifle at the required elevation.
6. Fire the rifle.

To render useless: Unscrew the igniter plug in the head of the grenade, holding the grenade with the rod downward.

Precautions:

1. A German rifle 98 or 88.05 only can be used.

2. Care must be taken that the grenade is not dropped, especially on the tail rod, as then it is liable to become "live," and will therefore detonate on firing. It should be carried head uppermost by the grenade, not by the rod.

3. The special rifle grenade cartridge must be used, and in no case a ball cartridge.

4. Tail rods which jam or rub when being placed in the barrel must not be used, and no force is to be employed.

5. Damp tail rods should be dried before use. All rods should be firmly screwed in.

[NOTE.—In a document captured September, 1916, an improved pattern of the 1913 rifle grenade is described. It is provided with a two-pronged safety pin like the 1914 pattern, but inserted in the brass base in order to hold the striker pellet from moving. This safety pin must be removed before firing. See Plate L.]

The following warning is also given: "After taking the grenade from the box it should be examined to see that the gas escape hole is closed and has not been blackened by the burning of the powder pellet. Grenades in which this has happened are dangerous and must not be used."

6. DISK HAND GRENADE. PERCUSSION. (DISKUS-HANDGRANATE, 1915.)

There are two patterns, one weighing 15 ounces and the other slightly smaller, 13¼ ounces. The former is made of sheet metal and is for throwing in the open; the latter is of cast iron and should only be thrown from behind cover.

DESCRIPTION (SEE PL. M).

Body.—Two iron shells, convex on the outside and with the edges either turned over or riveted. It contains two circular bags of explosive, each containing 2 ounces.

Method of ignition.—Consists of six metal tubes in the shape of a star, meeting at the center of the grenade plug. Four of these tubes carry striker pellets with caps at the inner ends, and opposite to each cap is one of the points of a four-pointed star. The outer end of each of these tubes is closed by a screwed plug. One of the re-

maining two tubes carries the detonator, of which the inner end is open. This tube is closed by a screwed plug with milled head with the letter "S" on it.

Safety arrangement.—The sixth tube contains a safety pellet divided into two prongs, one of which passes on each side of the star and protects the points. This pellet is retained in its position by a cap which closes the outer end of this tube. The cap is secured to the tube either by clips or by a safety pin with ring.

Action during flight.—Owing to the grenade turning over, the safety pellet flies out and the grenade becomes sensitive. When the edge of the grenade strikes the target the corresponding striker pellet drives the cap forward on to the point of the star. The flash passes into the detonator and explodes the charge. A low or horizontal throw may cause a failure. On detonation the fragments fly out laterally, and not to the front or rear

INSTRUCTIONS.

To prepare for use:

1. Hold the grenade in the right hand, safety pin upwards.
2. Pull out the safety pin with the left hand.
3. Pull off the cap and hold the safety pellet in position with the right forefinger. (If necessary, the safety pin can be replaced.)
4. Throw the grenade as high as possible, taking care that the edge is vertical.

These grenades can also be thrown with the strap provided in each box, but this method requires considerable practice.

To render useless:

1. Unscrew the plug of the tube, marked "S," opposite to the safety pin.
2. Remove detonator.

Warning:

Blinds are dangerous. As soon as any part of the safety pellet projects there is chance of detonation.

[NOTE.—The red grenade to be found in every box is a dummy for practice.]

7. SPHERICAL HAND GRENADE.

[Weight, 1 pound 10 ounces.]

Can be thrown about 30 yards.

DESCRIPTION.

(See pl. N.)

Body.—Spherical, about 3 inches in diameter, made of cast iron about one-third inch thick, and is filled with black powder or other explosive which does not require a detonator. The body is coated with varnish inside and out.

Method of ignition.—Combination of friction tube, lighter, and fuse. The friction tube is fired by pulling out the wire in the direction of the axis of the tube. (See fig. 2.) A wrist strap with a swivel hook is usually provided for this purpose. Time of burning, seven seconds. A similar lighter which burns for five seconds is also provided. It is distinguishable by the head of the fuse being painted red.

Safety arrangements:

1. Grenade and fuse kept separate during carriage.
2. The vent for the fuse in the grenade is closed by means of a zinc plug.
3. The holes A and B (see fig. 2) in the lighter are covered with waterproof paper.
4. The wire is bent in order to prevent a direct pull.

INSTRUCTIONS.

To prepare for use:

1. Take the lighter, remove the oiled paper from A and B and straighten the wire, taking care not to pull it.
2. Insert the lighter.

To throw:

1. Put on the wrist strap.
2. Hold the grenade in the right hand, with the igniter toward the wrist.
3. Hook the swivel at the end of the strap onto the wire pull of the grenade.
4. Throw the grenade.

If a strap is not provided, a nail or a loop of string should be passed through the wire pull.

To render useless:

1. Bend the wire down if it is straightened, taking care not to pull it.
2. Unscrew the lighter.
3. Shake out the contents of the grenade.

8. PARACHUTE GRENADE (PERCUSSION).

DESCRIPTION.

(See pl. O.)

Body.—Painted black, consists of a tin cylinder of explosive with hemispherical head of larger diameter containing shrapnel bullets. A buffer cylinder passes through the body and projects, so as to produce the explosion slightly above ground. The base of the body is closed by a wooden plug at the handle. A parachute safety arrangement is attached to the head of the handle in order to prevent fragments flying to the rear on explosion, and also to cause the grenade to fall on its head.

Method of ignition.—1. The detonator in the buffer cylinder supported by the screwed plug at the end. 2. The striker pellet with point and spiral spring.

Safety arrangements:

1. A cord 7 meters long, which normally is coiled up inside the handle, is attached to a long needle passing down the percussion pellet. A safety hook retains a ring attached to the end of the striker pellet and the needle passes through a hole in this hook. After the first 7 meters of the flight, the jerk on the cord pulls out the needle, and the safety hook is thus free to fall out sideways and so allow the percussion pellet to move forward on concussion.

2. Keep pin and creep spring. The former prevents the percussion pellet from falling back.

INSTRUCTIONS.

To prepare for use:

1. Unscrew the plug in the head.
2. Place in the detonator, fulminate downwards.
3. Screw in the plug.

To throw:

1. Tear off the band holding the parachute.
2. Holding the loop of the cord firmly with the first and second fingers of the right hand, take out the plug from the handle, unwinding as short a length as possible of the cord.
3. Hold the grenade in the right hand.

4. Retaining the loop of the cord, throw the grenade so that it will reach a height of 12 or 13 feet.

To render useless:

Unscrew the plug and remove the detonator.

The grenades may be found "live," in which case 1, 2, and 3 have already been done.

This grenade can be used in attack or defense, but it is particularly designed for the former, as the fragments are projected in a forward direction only, and so are not dangerous to the throwers. The safety arrangements prevent the grenade from becoming dangerous until it has flown about 7 meters.

9. SMALL TIN HAND GRENADE.

[Weight, 12 ounces.]

DESCRIPTION.

(See Pl. P, figs. 3 and 4.)

Body.—Tin case, $4\frac{7}{8}$ inches by $1\frac{11}{16}$ by $1\frac{11}{16}$, filled with explosive.

Method of ignition.—Combined match-head igniter, fuse, and detonator (see fig. 3).

The match-head igniter consists of a small lead tube closed at one end with a ball of red phosphorus, varnished, and covered with oiled paper.

A piece of safety fuse is pushed home and secured in position by crimping the tube around it; the detonator is fixed to the other end of the fuse in a similar manner.

Safety arrangements:

1. The grenade and igniter are kept separate during carriage and a wooden plug is put into the grenade in place of the detonator.

2. The phosphorus head is protected from friction and damp by water-proof paper.

INSTRUCTIONS.

To prepare for use:

Take out the wooden plug (if necessary use the rectifier) and insert the igniter. The igniter is kept in place by the lead tube fitting tightly into its seating; the joint should be waxed.

Tear off the paper cover from the lighter.

Hold the grenade in the right hand, rub the match head with some rough material (side of match box, etc.); a wind-match or pocket-lighter may be used instead.

Throw immediately.

Time of burning, 6 seconds.

To render useless: Take out igniter and fill up hole with mud, etc.

10. CYLINDRICAL HAND GRENADE WITH SPRING IGNITER, CHARGED WITH MISSILES, ETC.

[Weight, 2½ pounds.]

DESCRIPTION (see pl. P, figs. 1 and 2).

Body.—Cylindrical tin of explosive, 2 inches diameter, placed in a tin 3 inches diameter, the space between being filled with nails, scrap iron, etc. The bottom is closed by a wooden plug, in which a small hole is bored for the detonator. The handle is of wood, 8¾ inches long, the head of which forms the wooden base plug. To secure the body to the handle, the edge of the outer cylinder of the body is turned down over the base plug.

Method of ignition.—Consists of a spring, striker, and cap, incased in brass tube, fastened to the handle by a steel band. Fuse and detonator are attached in the usual way.

The spring is compressed by a collar at the end of the striker rod. The rod is held back by a safety pin passing through it at the end of the case. As soon as the pin is released, the striker flies forward and fires the cap, thus lighting the fuse.

This spring lighter is used in most of the German extemporized hand grenades, land mines, charges for destroying dugouts, etc.

Fuse, about 2 inches long. Time of burning, 6 seconds.

INSTRUCTIONS.

(*a*) To prepare for use:

1. Hold the grenade in the right hand.
2. Withdraw the safety pin.
3. Throw at once.

(*b*) To render useless:

1. Remove the handle and base plug by raising the turned-down edge of the cylinder. This must be done very carefully.
2. Empty the contents of the body.

10.—HAIRBRUSH HAND GRENADE WITH SPRING IGNITER.

[Weight, 2½ pounds.]

DESCRIPTION (see pl. P, figs. 1 and 2.)

Body.—Tin box, 2¾ inches by 2¾ inches by 6 inches, filled with explosive. This box is nailed onto a wooden handle. Length, complete, 15 inches.

Method of ignition.—Spring igniter, fuse, and detonator, similar to that used in the cylindrical grenade with spring igniter. The igniter is kept in position by means of a zinc band screwed onto the handle.

Safety arrangements and instructions.—As for cylindrical hand grenade with spring igniter see 9 above.

APPENDIX V.

SUMMARY OF INSTRUCTIONS ISSUED BY A BRIGADE FOR THE SUPPLY OF GRENADES IN A GENERAL ATTACK.

[NOTE.—These instructions, which were issued for the attack on July 1, 1916, are only to be taken as a general guide on the points on which instructions should be issued.]

Equipment.—The following number of grenades will be carried by the personnel of bombing squads:

	Mills.	Rifle grenades.	Smoke bombs.
Noncommissioned officers	6	4	2
2 bayonet men	12	.....	4
2 throwers	24	.....	4
2 carriers (reserve throwers)	24	.....	4
2 rifle bombers	8	20	.....
	74	24	14

These grenades will be dumped near the billets to be occupied by the brigade prior to the commencement of operations. When once they have been distributed they become part of the men's equipment. The man himself should see that his grenades are ready for immediate use and all safety pins easy of removal.

In addition to the above, every Infantry soldier will receive two Mills grenades. The requisite number of grenades will be issued to battalions previous to operations and will become part of their equipment. The grenades should be carried in the lower pockets of the jacket and be carefully inspected by the platoon officer concerned.

Grenade stores.—The following grenade stores will be established:

	Mills.
1. Right battalion, at	1,000
2. Center battalion, at	2,000
3. Left battalion, at	1,000
4. Left battalion, at	2,000
5. Advanced brigade store (reserve store), at	10,000
	16,000

In addition there will be a reserve of 2,000 rifle grenades (1,000 short and 1,000 long) and 1,000 smoke bombs distributed between the above stores.

The main supply of grenades to the brigade during operations will be maintained by the divisional store at ——.

Total number of grenades with the brigade at commencement of operations:

	Mills.	Rifle grenades.	Smoke bombs.
(*a*) With bombing squads	4,736	1,536	896
(*b*) 2 per man	5,600		
(*c*) Stores	16,000	2,000	1,000
	26,336	3,536	1,896

Battalion bombing officers will be responsible for the establishment of advanced battalion stores in the captured trenches as early as possible.

Carriers.—Officers commanding companies will be responsible for organizing the flow of grenades from the advanced store to forward parties; the battalion bombing officer will be responsible for the establishment of the advanced store in the captured trenches, for informing officers commanding companies of the position of the advanced store, and for the supply of grenades from the battalion store to the advanced store. The approximate position of the advanced store should be decided beforehand.

The brigade bombing officer is responsible for the flow of grenades from the brigade store to the battalion store and for the fusing of all grenades before they leave the brigade store.

To give effect to this system—

In each platoon five men will be told off, in addition to the company bombers, to act as carriers if required. They will wear a special distinguishing mark.

From each battalion store the battalion bombing officer and a party will work forward to establish an advanced store, a noncommissioned officer from the brigade will be at each battalion store to supervise the maintenance of supply from the brigade store.

At the brigade store will be the brigade bombing officer and his party, fusing and carrying forward to battalion stores.

The brigade will be represented by two men in the divisional store.

Method of carrying.—One hundred spare bags will be kept in each battalion store and 200 in the advanced brigade store. One thousand grenades in each store will be ready in bags. It will be left to the discretion of the noncommissioned officer or officer in charge whether grenades are sent forward in bags or boxes.

Indents.—All indents for grenades to brigade advanced store must bear the following details:

(*a*) Unit.

(*b*) Type and number required.

(*c*) Destination.

(*d*) Urgency or whether merely to complete establishment.

Supplies to battalions will, in every case, be dealt with first.

Fused grenades.—All grenades in stores previous to the operations will be fused, and the safety pins of No. 5 Mills bombs will be carefully inspected.

Mobile reserve.—The battalion mobile reserve wagons will be brigaded during operations and will be prepared, if necessary, to dump the grenades at the brigade advanced store, and afterwards to ply between the divisional store and the brigade store. The latter in the event of the tram route being destroyed.

Battalion bombing officers will see that the grenades in the wagons are carefully inspected beforehand. These grenades will not be fused.

The route from divisional store to brigade advanced store should be reconnoitered.

APPENDIX VI.

GERMAN GRENADE TACTICS.

[Translation of a German document.]

I. Bombing Parties.

3rd Battn., 235th Res. Inf. Regt.

12th December, 1915.

The bombing party (Handgranatentrupp) operates, as a unit, chiefly in the trench itself, its action being both offensive and defensive; the manner in which it should be stationed and distributed, employed, armed, led, and safeguarded must be regulated accordingly.

Men selected for this work should be courageous and expert hand-grenade throwers. They should wear a distinctive badge. In each platoon there is a bombing party consisting of six men, including their commander. When one of these men becomes a casualty, a substitute should be ready to take his place. The bombing party should be stationed approximately in the center of the platoon. Boxes containing grenades should be placed near the party; they should be clearly marked as containing grenades and should be reserved for the use of the party in the first instance.

(*a*) Should the enemy have penetrated into a small portion of the trench, and should the troops on the spot not be able to deal with him by means of the bayonet or hand grenades, the bombing party should, without waiting for orders, immediately attack the enemy with grenades before it becomes necessary to erect a barricade in the trench. On a signal from their commander, the men of the bombing party equip themselves with hand grenades and collect round him.

All men of the party carry their rifles slung, bayonets fixed, and daggers ready, with the exception of the two leaders who do not carry rifles. The latter carry as many grenades as they can conveniently handle and should, if possible, be armed with pistols. The commander, similarly armed, follows the two leading men. If no pistols are available, the commander, who should cover the two leading men, carries his rifle ready loaded in his hands. The remaining three men follow the others a traverse in rear. They keep

within sight of their commander and carry as many grenades as possible. When possible the grenades are carried in their boxes. The two leading men advance along the trench in a crouching position, so that the commander can fire over them. The interval between traverses is crossed by a rush.

(*b*) If the enemy has penetrated into the trench with a large force and a continuation of his attack is to be expected, as good a barricade as circumstances permit should be erected. The bombing party should at first remain on the defensive in rear of this barricade or behind a breastwork. Rifles should be unslung ready for use. The commander and the three rear men should take up their position behind the nearest traverse and within sight of the two leading men.

Bombing parties belonging to the platoons in support and in reserve should be stationed somewhere in the vicinity of the communication trenches, and should be brought up to a strength of eight men, including the commander.

[Translation of a German document, dated 28, 2, 1916.]

II. Training in the Use of Hand Grenades.

(Supplementary orders to those issued by the One hundred and eightieth Regiment, No. 729 of 6, 2, 1916.)

In training men for grenade fighting the following points are to be noted:

1. During practice with dummy grenades the thrower must always act as if using live grenades and think of the timing, so that when using live ones he is able to make the necessary pause; counting, e. g., "zwei und zwanzig" (22), "drei und zwanzig" (23), "vier und zwanzig" (24), appears practical. These three numbers give the correct amount of pause approximately.

As a general rule, the grenades are thrown too soon. It must be made clear to the bombers that this practice is quite wrong and can have disastrous results; for the enemy has time to avoid grenades or to throw them back or to one side as the case may be.

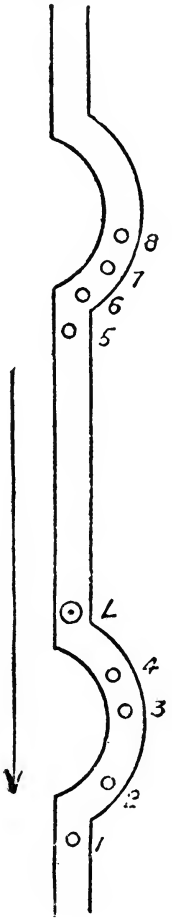
2. When the bombing squads of the platoons are fully trained, a second squad of each platoon is to be formed and trained. The first and chief bombing squads of platoons are, however, to be given further training every 14 days. Lieut. Helferich will report to me when he considers the bombing squads of the various companies fully trained. I shall then take steps to verify this.

3. The bombing squads and also the first squad of the bombing platoon are to be armed and equipped as follows:

Nos. 1–4. Pistol, dagger, and 6 grenades each.

Nos. 5–8. Rifle, 6 grenades, and 25 sandbags each.

4. Trench tactics will be practiced as shown below:



No. 1. Thrower.
No. 2. Carrier.
No. 3. Thrower.
No. 4. Carrier.
L. Leader.
Nos. 5 and 6. Carriers.
Nos. 7 and 8. Spare men.

It is essential to keep the men extended in order to facilitate freedom of action and to enable them to dodge the enemy's grenades, but care must be taken that cohesion is not sacrificed in consequence.

Each squad must be so trained that every man can take the place of any other in it.

The leading man (No. 1) only will throw, the carrier (No. 2) will prepare the grenades.

Two cases may arise when Nos. 2 and 3 will also throw—(*a*) At the moment of making an attack in order to surprise and confuse the enemy with a sudden shower of grenades. As soon as the attack is in progress Nos. 2 and 3 will cease throwing. (*b*) When the resistance is too strong for the leading thrower to overcome it by himself.

5. The sandbags carried by Nos. 5–8 serve for the rapid construction of a barricade which is held with rifles.

One man, by means of his haversack strap, can easily carry 25 sandbags on his back and, with rifle slung, experiences little inconvenience.

6. The greatest attention is to be paid to the instruction of the leaders, for they will have to act on their own initiative in most circumstances.

In the bombing platoon the position of the platoon commander varies with the situation, but, as a general rule, the most suitable position would be with No. 3 group.

7. In trench fighting the platoon commander or squad leader must pay particular attention to the following points:

(*a*) See that every man is provided with six grenades.

(*b*) See that there is no crowding, in order to minimize the risk of casualties from a well-aimed enemy bomb. There is always danger of crowding during a check in the advance.

(*c*) When the resistance of the enemy is not too great, the advance must always be continuous. Special attention must be paid to the supply of grenades.

(*d*) As soon as a traverse has been taken No. 2 calls out "Cleared" (Geräumt), the squad leader gives the command, "Advance"

(Vor). Every section of the trench captured must be at once occupied by riflemen.

(*e*) The squad leader must be provided with small white flags which he will place at intervals on the top of traverses to mark the progress of the attack. This will prevent bombing parties which are working up the same trench in opposite directions from bombing each other by accident.

Small white flags will be made and taken with the men when they carry out training.

(*f*) Should the resistance of the enemy be so strong that further advance is impossible even with the help of Nos. 2 and 3, the construction of a barricade must be proceeded with at once. The squad leader will give the command, "Sandbags up" (Sändsacke vor). The platoon commander can then decide whether it is possible to relieve the bombing squad and continue the attack, or whether to call a halt in the operations.

The construction of a barricade at *a*1 will be scarcely possible, owing to the number of the enemy's grenades which are being thrown, more especially if our intention is known to him.

The barricade will, therefore, be built at *a*, and, if possible, the space *a*–*b* will be roofed over with stout planks as a protection against grenades.

Nos. 1–4 will hold back the enemy until the barricade is completed.

(*g*) Should it be necessary to block a communication trench, a good thrower at *a* will give the necessary protection to the remainder, who will build the barricade at *b*.

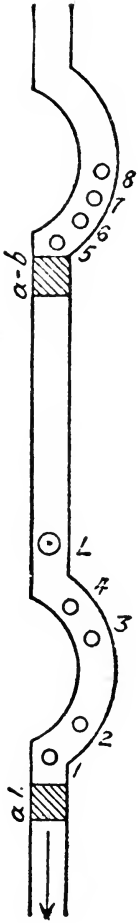
8. The question of the supply of hand grenades is of the utmost importance.

(*a*) *Supply during an attack across the open.*—If the first wave of the assault has succeeded in entering the enemy's trench, communication to the rear must be kept up so that sandbags, containing about six grenades each, can be passed forward continuously.

(*b*) *Supply in the trench.*—No. 1 (thrower) will only use the grenades which are passed up to him—never his own, which must be kept as a reserve for an emergency.

In grenadier platoons every squad, except the first, must be provided with a small box of grenades or with three or four sandbags each containing six grenades. The passing up of grenades should be thoroughly practiced.

(Signed) FISCHER.


8
7
6
5
a-b
L
4
3
2
1
a-l

[Captured German document, dated February, 1916.]

III. Hand Grenade Training.

Training in fighting at close range with hand grenades will be carried out by officers who are acquainted with all the details of this weapon and have had practical experience of its use in the field. The officers have first to train the men detailed as bombers and then to occupy themselves with the further individual training of the bombing squad.

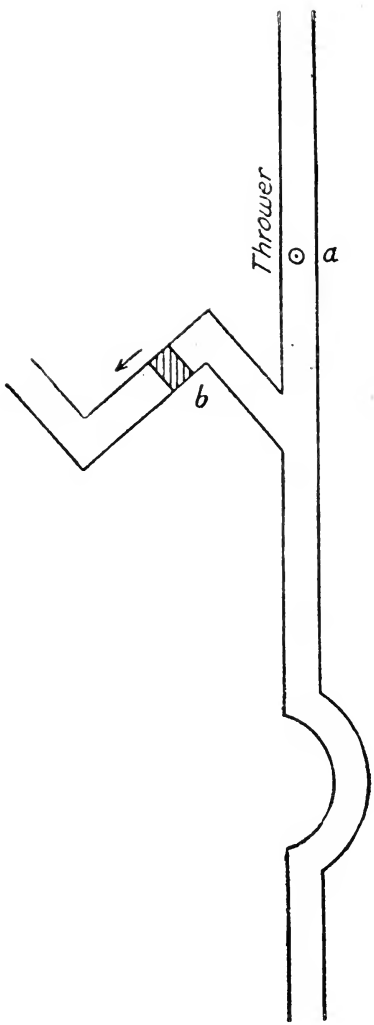
Training takes place on ground specially set aside for the purpose (Handgranatenstand), where the precautions for safety laid down in instructions "Hand and Rifle Grenades," page 28A, are properly carried out, and where various targets (trenches with loopholes and entanglements, sapheads, machine-gun emplacements, farm buildings, and firing lines represented by screens) are provided. The course of training will be divided into the following parts, viz:

(*a*) Instructions in the various patterns and construction o grenades, the nature and effect of the explosive and detonators employed, storing, fuzing, carrying and using bombs and precautionary measures to be taken.

(*b*) Drill with unfuzed practice hand grenades. Officers should next instruct the men individually in bomb throwing at a specified range at different targets. Men should be practiced in throwing when standing, kneeling, and lying, and finally actually in trenches. The bombing section should be instructed in grenade throwing in specified cases, such as attacking a trench, bombing a trench, assaulting fortified buildings, machine-gun emplacements, etc. Men should be practiced in springing out of trenches, doubling, throwing themselves down, springing up, pulling the friction lighter on a signal or whistle, throwing and lying down again, etc. From the start particular attention should be paid to making the man take the grenade in the same hand as he uses for throwing it (left-handed men in the left hand) and using the other to pull the friction lighter, so that time ($5\frac{1}{2}$ seconds) required for throwing the bomb may not be cut short or even entirely used in changing hands after lighting the bomb.

(*c*) Drill with fuzed practice hand grenades.

Men should only proceed to practice with live bombs after ease, assurance, and safety in the former practices have been attained. As the detonator bursts the shell of the grenade and can send fragments flying, great caution should be observed. These practices should teach the men to estimate the duration of the fuze and enable


Thrower
a
b

them to choose the proper moment for throwing. The habit which has arisen in various places of making the man count three or five before throwing is absolutely forbidden. The habit may lead to the man's counting so slowly that the bomb actually goes off in his hand. Haste and exaggerated speed in throwing are, however, quite wrong. The man in his anxiety is likely to throw wide. The length of the fuse (5½ seconds) gives time for pulling the friction lighter and proper aiming and throwing. On the other hand, the 5½ seconds is purposely short so that the enemy can not have time to pick up the grenade and throw it back.

After assurance in practices (*b*) and (*c*) has been gained, classes may proceed to (*d*).

(*d*) Practice with live bombs. In accordance with regulations for safety (Instructions "Hand and Rifle Grenades," p. 28A), only one man will throw, the others taking cover. Every man, before being regarded as properly trained, must have thrown several bombs successfully. Officers intrusted with the training of bombers will inspect the storing and safe-keeping of hand grenades in the front trenches and in their depots, and will see that bombs which have become unusable are duly replaced. For depots connected with pioneer parks the pioneer officers concerned are responsible.

On behalf of the army commander.

The Chief of the General Staff.

ILSE.

H. Q., XIII Army Corps.

G. H. Q., 22.2.16.

VI. TRAINING.

Training will be carried out within the company under the company commander. As a general rule, all officers, noncommissioned officers, and men should be instructed. The senior officers—e. g., battalion commanders—will insure that the training carried out by companies is adequate.

A bombing field will be laid out in the vicinity of all billets. Practices should be carried out according to the experiences of actual fighting and made as varied, stimulating, and instructive as possible. The main purpose of the training is to make a man confident in the use of what at first appears to him a most uncanny weapon, and to convince him of its great effect when properly used. Competitions in throwing between companies, battalions, and regiments will do much to promote efficiency.

Particular attention is drawn to the regulations of the Gen. Kdr. concerning the observance of precautionary measures during practices in live bomb throwing.

The specially picked bombing section mentioned in A. O. K. 4 will provide a bombing squad in each platoon, one noncommissioned officer, and eight men strong, who should be chosen for their coolness and experience, volunteers, if available, being selected. These three bombing squads can be used by the company commander, either separately or together, during an attack, a counterattack on lost portions of our trenches, or on any other occasion. The battalion commander can, if he thinks it desirable, employ the bombers of several companies together. Each man can carry up to 20 grenades. The method of carrying should be the subject of careful experiments. The following methods are worthy of consideration: Carrying on a strap, in a belt hung around the neck, in a sandbag with a strap, or in two sandbags hung round the neck. Bombers do not carry either rifle or bayonet, but are armed with revolver, trench dagger, and a short spade with a sharp edge, or instead of the latter a knobkerry. To insure a proper supply of bombs, a carrying party must be organized as demanded by the circumstances.

VII. Use and Application of the Grenade.

The hand grenade is both an offensive and defensive weapon, and, as such, indispensable. Specific rules for procedure in different phases of fighting can not be laid down.

In the case of a counterattack on lost trenches the fighting should, as a general rule, be so arranged that the trench is methodically cleared bay by bay and at once occupied and consolidated by the sandbagging party in rear of the bombers.

Bombers will be similarly employed during an attack on a hostile position. Bombers will in this case be very useful on the flanks for clearing the adjoining trenches and for repelling the inevitable counterattack.

Should the enemy make a frontal attack on our position, bombs will be thrown by the entire trench garrison as soon as the enemy comes close enough. The choice of the right moment for the change from rifle to grenade is a matter for the platoon or section commander, and very often for the individual man. Great emphasis should be laid on this point during training, and men should be shown that a premature use of grenades is useless and may be fatal.

Frhr. V. Watter.

PLATE A.

BLOCKING GATE.

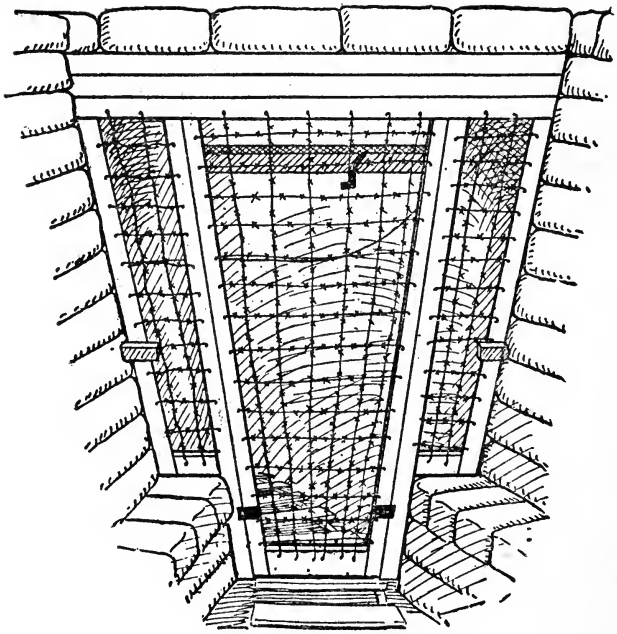
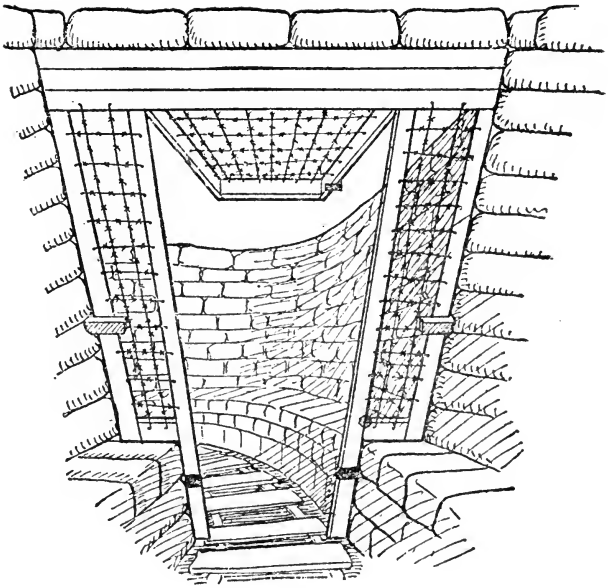


PLATE A.—(*contd.*)

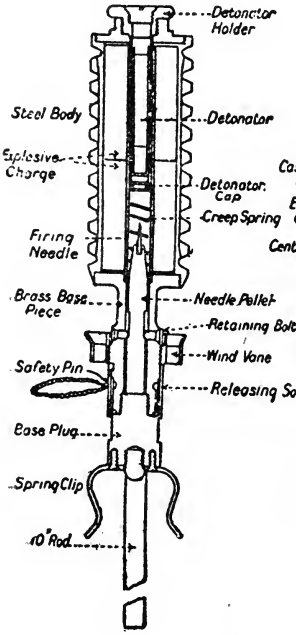


When gate is open it rests on a hook. This hook can be pulled aside from a distance by a wire or chain. The gate is self-locking and can be opened only from the side of the defenders.

A simple swing gate, that is, one swinging horizontally instead of vertically as shown in the above plate, is preferable.

PLATE B.

GRENADE, '303" SHORT RIFLE. No. 3. FIG. 1.



GRENADE, HAND. No. 5. FIG. 2.

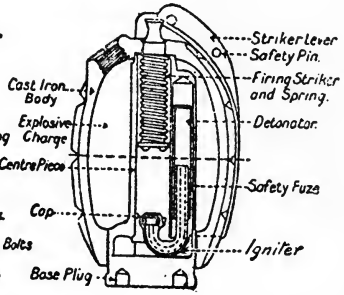
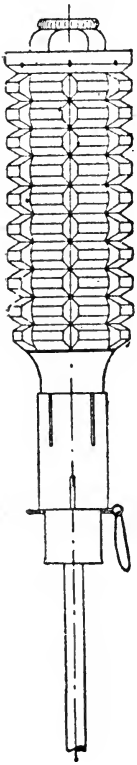
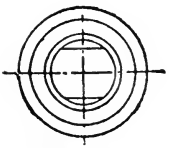


PLATE C.

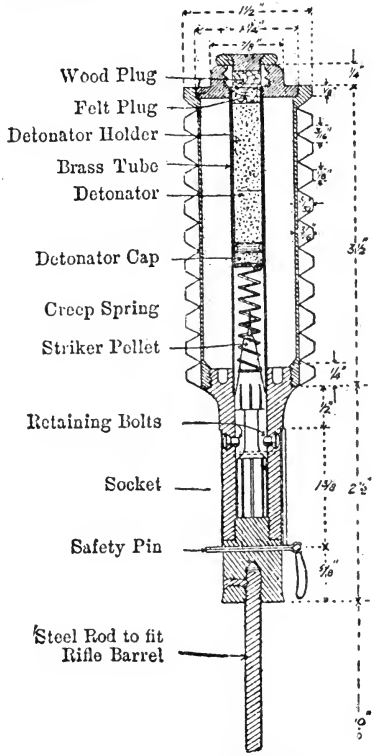
VANELESS RIFLE GRENADE, No. 20.
Half size.

Elevation.





Plan.



Section.

PLATE D.

PIPPIN RIFLE GRENADE, No. 22.
Half Size.

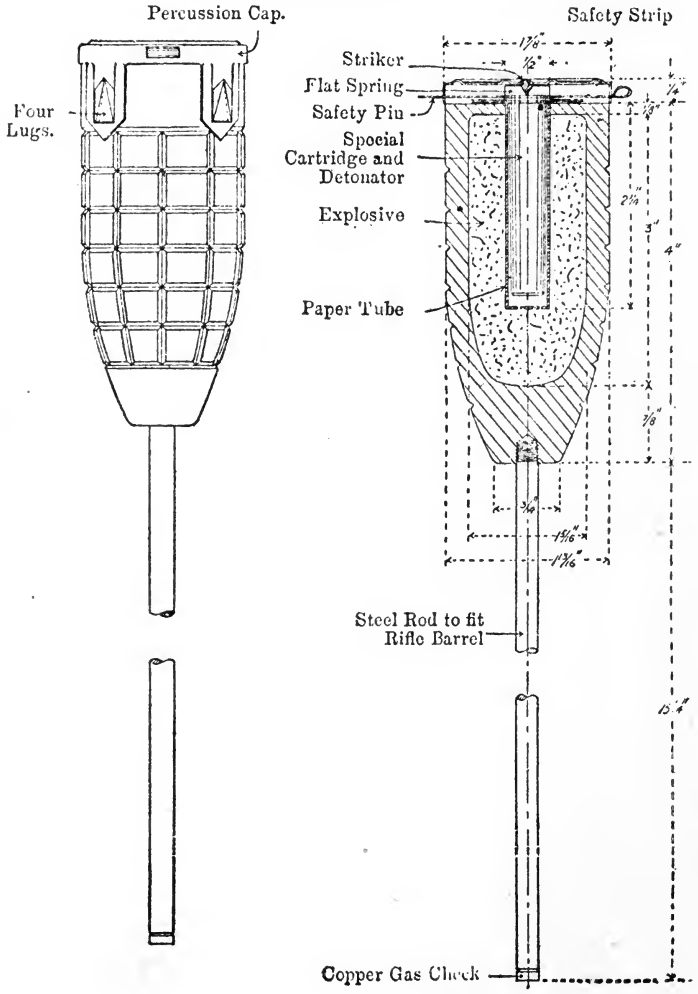
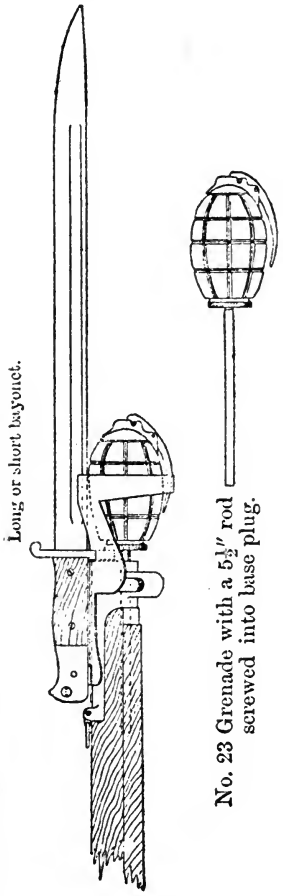
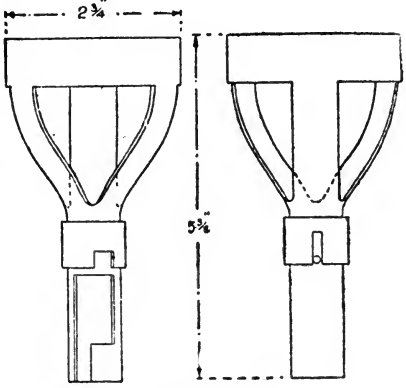


PLATE E.

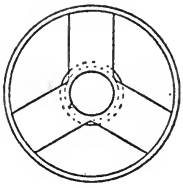
ATTACHMENT FOR FIRING MILLS GRENADE FROM A RIFLE.



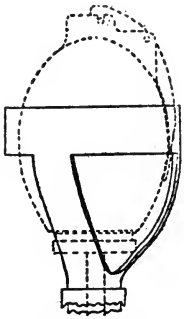
ATTACHMENT FOR FIRING MILLS GRENADE FROM A LONG RIFLE.



Elevations.



Plan.
$\frac{1}{16}$" steel.

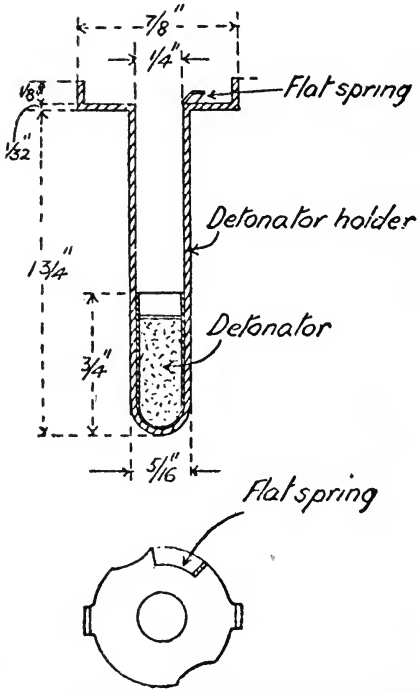


Elevation.

PLATE F.

DETONATORS.

Fig. 1.

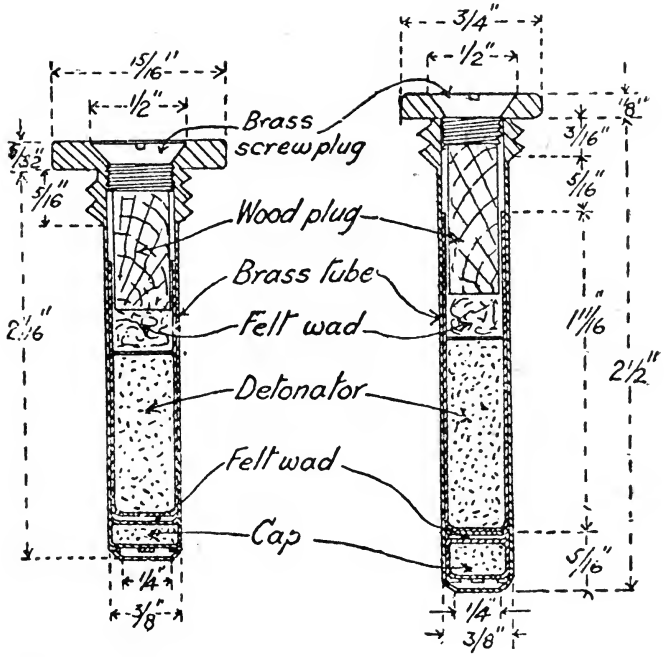


FOR NO. 1 (SERVICE HAND GRENALE).

PLATE F—(*contd.*).

Fig. 2.

Fig. 3.



For No. 2 (Hales or Mexican Hand Grenade).

For No. 3 and No. 20 (Hales Rifle Grenade and Vaneless Pattern).

PLATE F—(*contd.*).

Fig. 4.

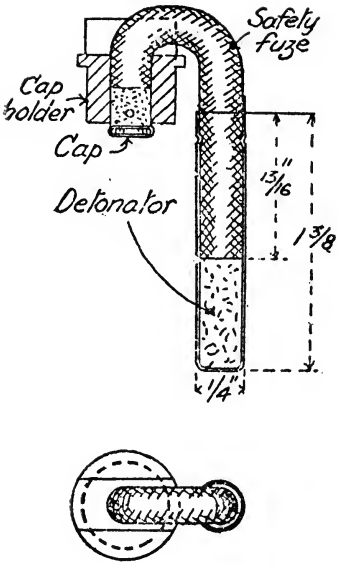


Fig. 7.
No. 6 Detonator.

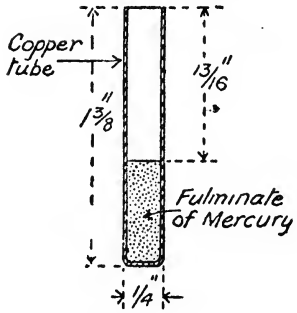
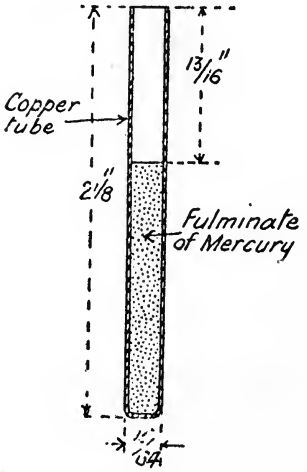


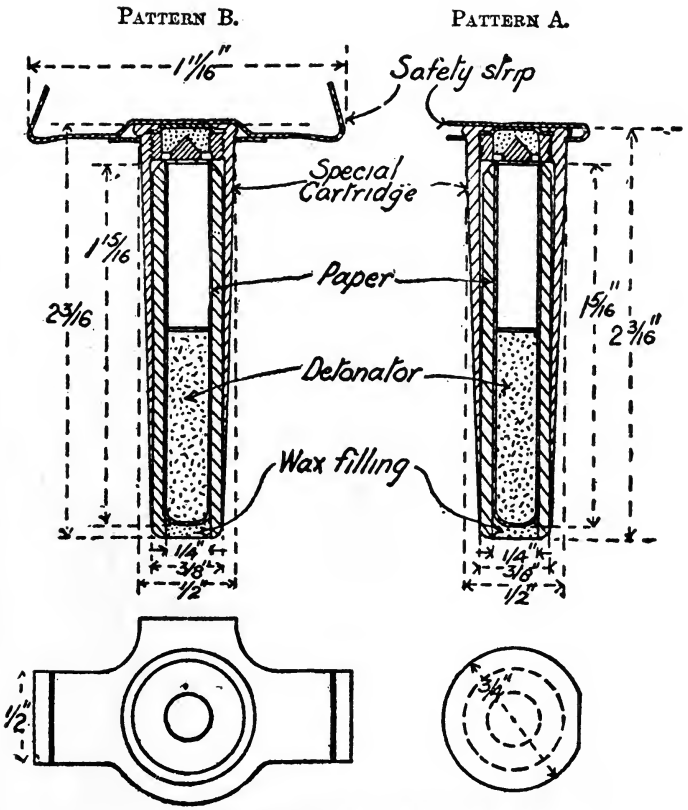
Fig. 8.
No. 8 Detonator.



For No. 5 and No. 23 (Mills Hand and Rifle Grenades).

PLATE F—(*contd.*).

Figs. 5 and 6.



FOR NO. 22 (PIPPIN RIFLE GRENADE).

97777°—17——7

PLATE G.

GERMAN CYLINDRICAL HAND GRENADE.
With handle (earlier type).

Fig. 1.

Fig. 2.
Section.

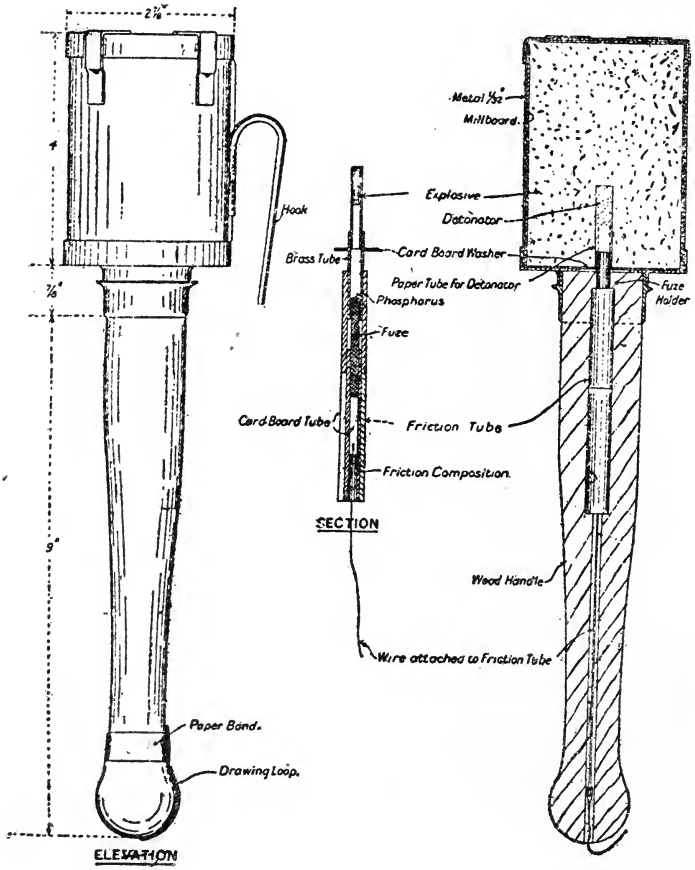


PLATE G—(*contd.*)

Fig. 3.—GERMAN CYLINDRICAL HAND GRENADE.
End of handle of later type. Full size.

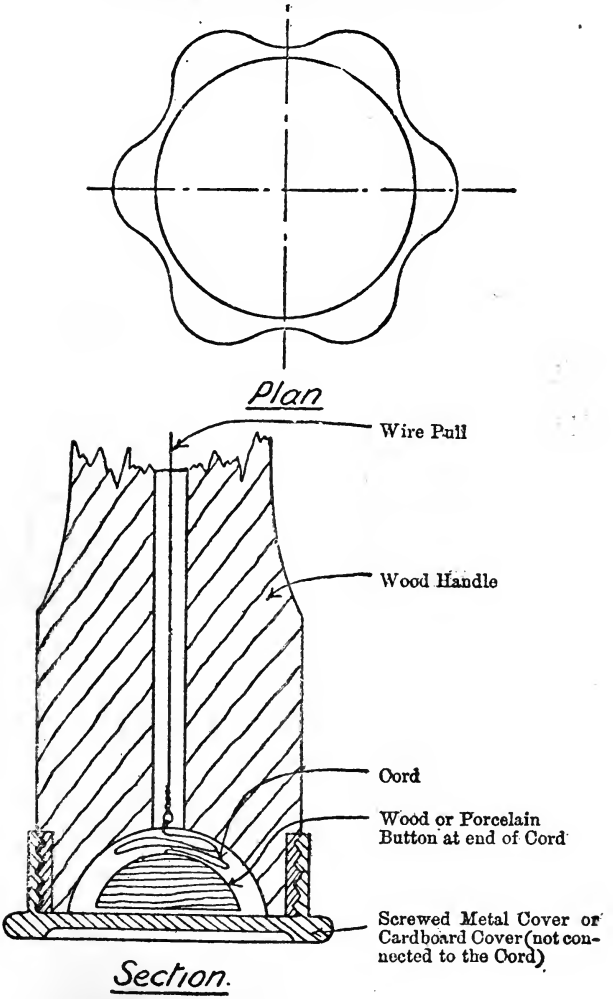
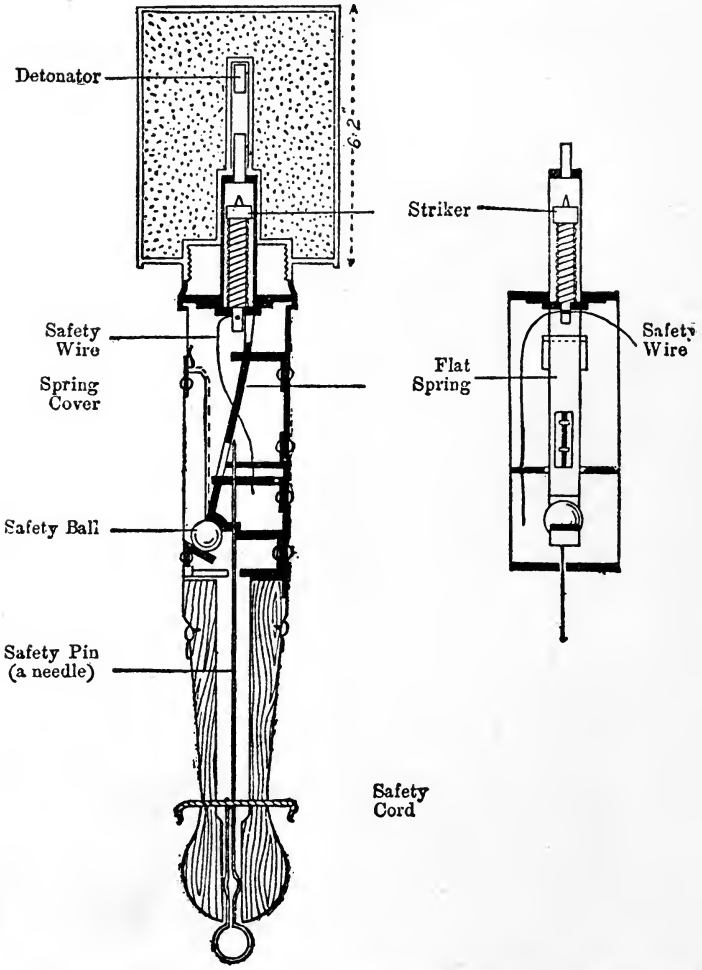


PLATE H.

GERMAN GRENADE.
CYLINDRICAL HAND GRENADE WITH HANDLE (PERCUSSION).
Half full size.



In another description it is stated that the handle is covered by a cap. Under this is a weight which serves to pull out the safety pin when the grenade is thrown.

PLATE J.

GERMAN EGG HAND GRENADE.

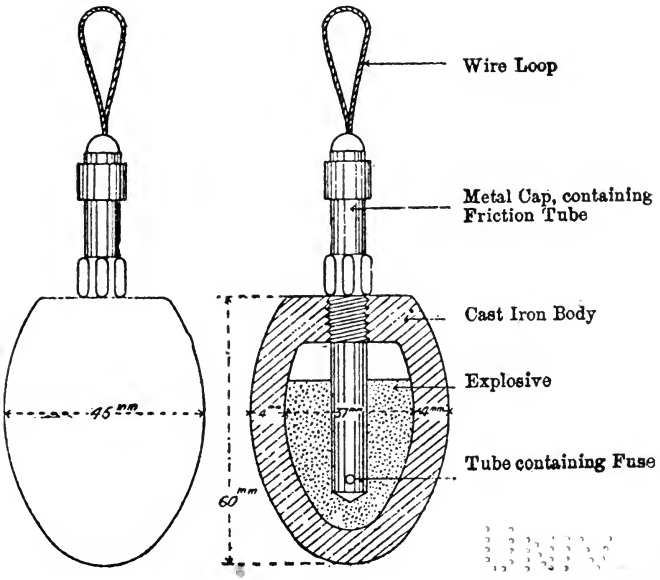


PLATE K.

GERMAN RIFLE GRENADE, 1914.

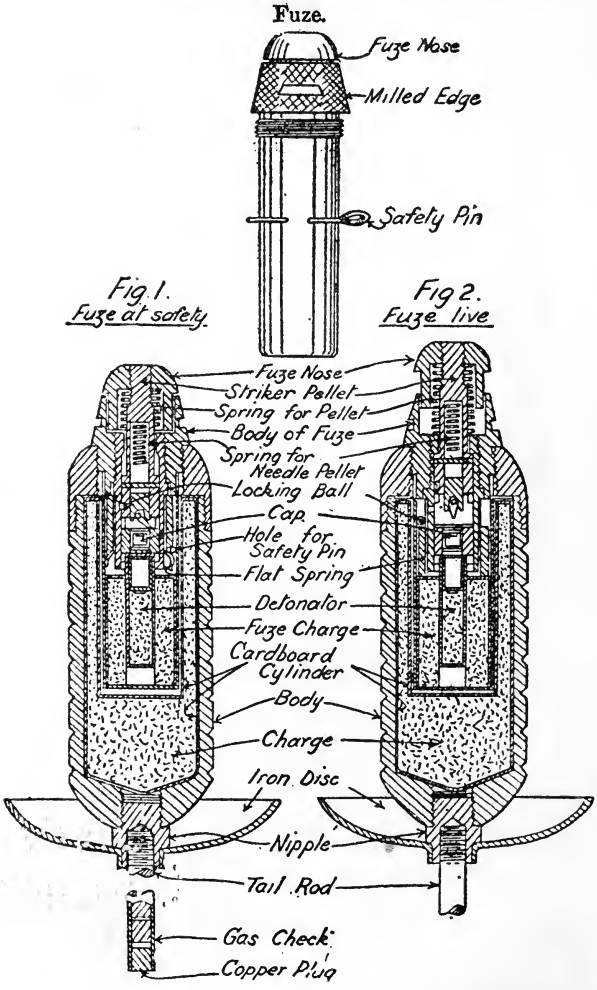
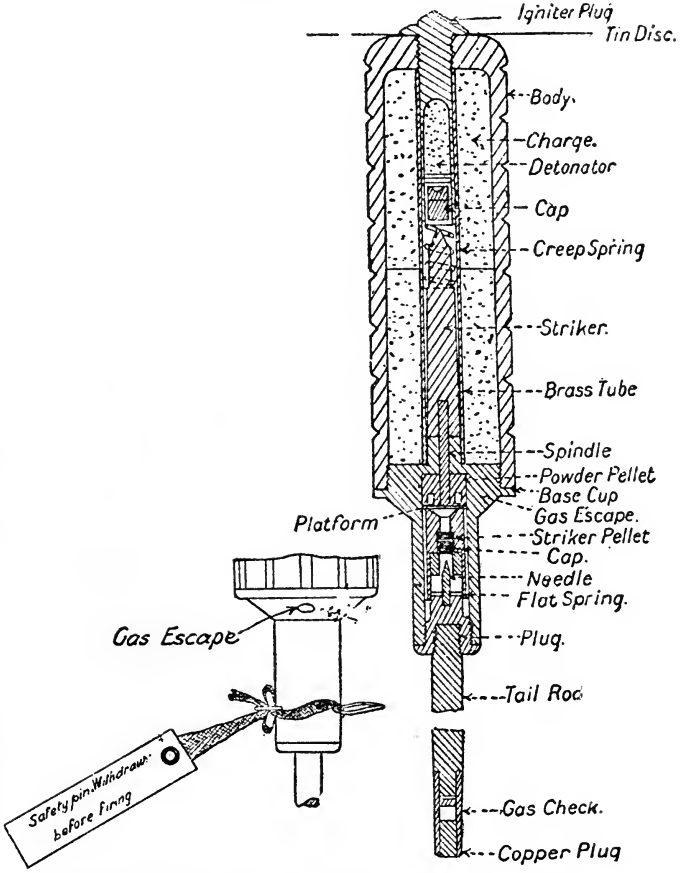


PLATE L.

GERMAN.

Rifle Grenade, 1913.



To show safety pin in latest pattern.

PLATE M.

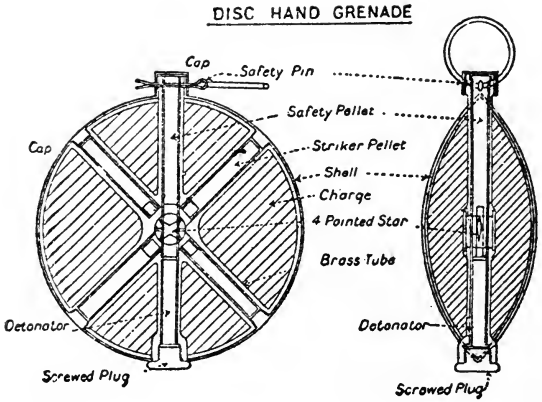

DISC HAND GRENADE
Cap
Safety Pin
Safety Pellet
Cap
Striker Pellet
Shell
Charge
4 Pointed Star
Brass Tube
Detonator
Screwed Plug
Detonator
Screwed Plug
(49)

PLATE N.

GERMAN SPHERICAL HAND GRENADE.

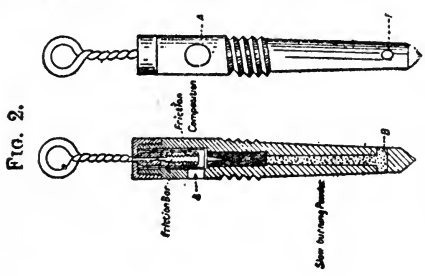
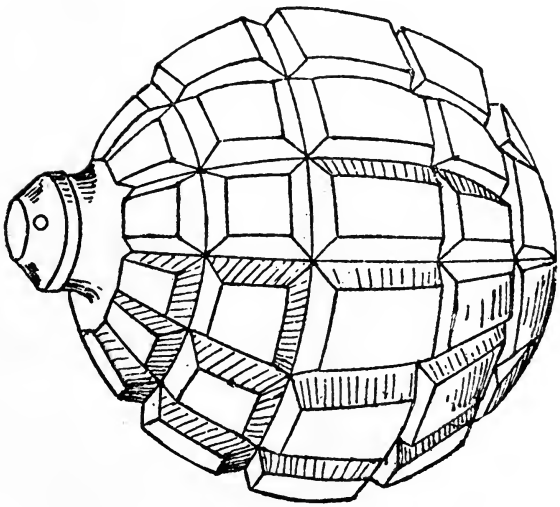


FIG. 2.

Section. Elevation.
Friction lighter.

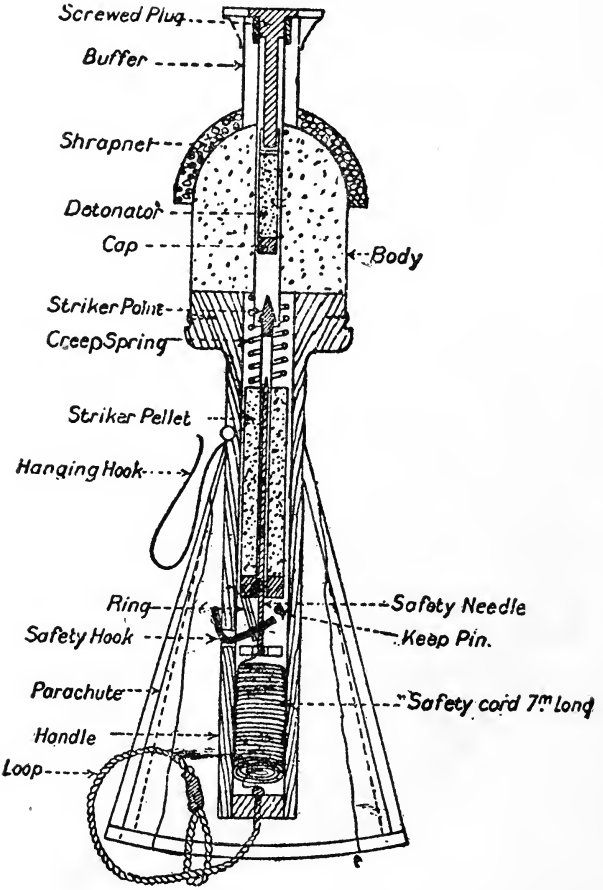


Scale ½.

PLATE O.

GERMAN GRENADES.

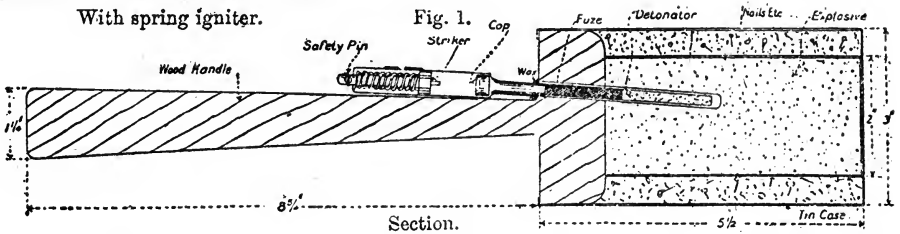
Parachute Hand Grenade.



German Cylindrical Hand-Grenade

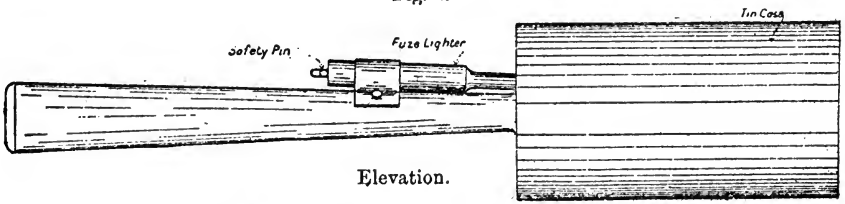
With spring igniter.

Fig. 1.



Section.

Fig. 2.



Elevation.

German Small Tin Hand Grenade.

Fig. 3.

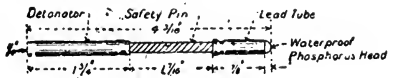


Fig. 4.

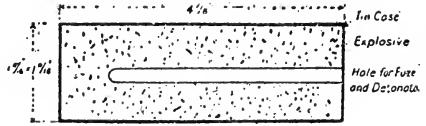
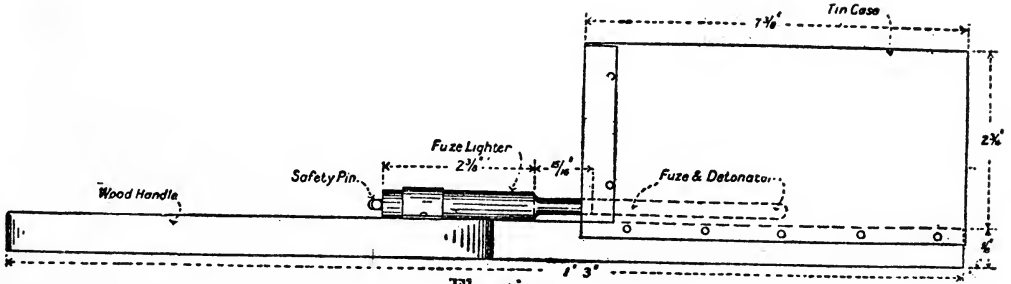


PLATE P.

German Hair Brush Hand Grenade.

Fig. 1.

Section.



Elevation.

Fig. 2.

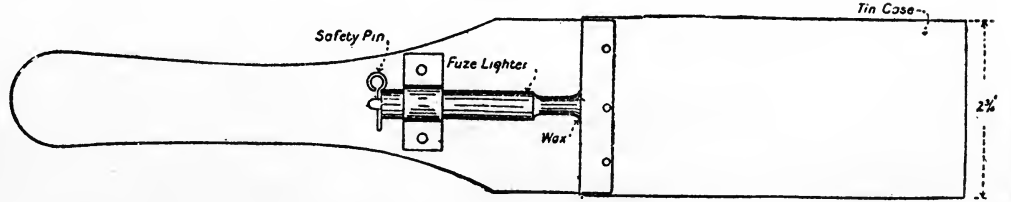


PLATE Q.

NOTES OF SOME RECENT BOMBING OPERATIONS, WITH EXAMPLES.

[Issued by the General Staff, November, 1916.]

1. *Cooperation.*—Bombing attacks carried out without careful organization and cooperation of Lewis guns, rifle grenades, Stokes's mortars and snipers are likely to fail as a rule, and the most careful training at brigade and divisional bombing schools is necessary in order to insure the best results.

Snipers and Lewis guns must be handled boldly. Pushed out in the open to a flank, they are likely to be of the greatest value in repelling counterattacks and assisting the advance of bombing parties.

Lewis guns were often most valuable as substitutes for bombing squads for blocking straight pieces of trench.

The Germans frequently make use of machine guns for this purpose.

2. *Stokes's mortar shells.*—It has been found useful to provide bombers with Stokes's mortar shells, with one safety pin, and creep spring removed, thus turning the shell into a Mills's grenade on a large scale with a priming fuze up to 13 seconds. One of these shells is quite sufficient to severely damage entrances to dugouts, tunnels, etc.

3. *Mills's rifle grenades.*—These rifle grenades have been found especially useful in assisting the advance of bombers, their range of 100 yards being of great value when the bombers are outraged by German "egg" grenades.

An ample supply of rifle grenades is of the utmost importance, for they can frequently prevent hostile bombing parties from being organized for attack.

In order to facilitate the supply of Mills's rifle grenades, all Mills's grenades are now being tapped for rods.

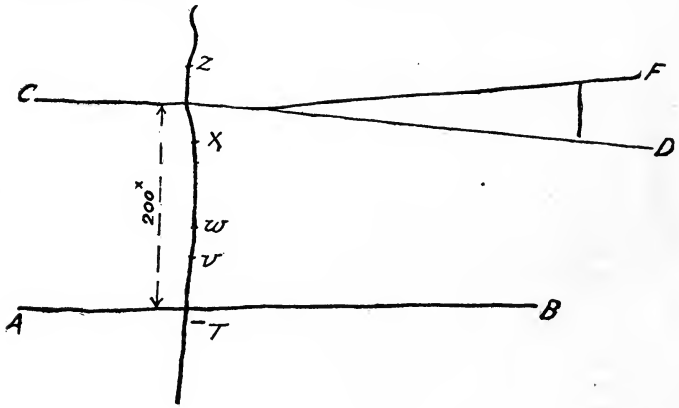
4. *Supply of grenades.*—The proper organization of a plentiful supply of bombs is absolutely essential. Several advanced dumps, therefore, must be made when bombing operations are anticipated. The expenditure of bombs is extraordinarily large, and the replenishment of the advanced dumps is therefore a matter of great difficulty. A permanent carrying party is essential. Troops in support, if recently relieved, are often too exhausted to perform this very arduous duty.

The use of a chain of men for passing grenades forward in sacks from hand to hand proved very successful. When this method could not be used, relays working within well-defined limits—that is, from dump to dump—also proved very satisfactory. In this case grenades were carried in boxes from brigade headquarters to the fire-trench dump and thence in sand bags, 12 in each bag.

EXAMPLE I—ATTACK BY THE A BATTALION A. I. F. (NIGHT OF 29TH-30TH AUGUST).

1. *Orders.*—The line C D, C F was the objective for a company holding the line A B.

We had a block at V, the enemy having blocks at W and X in the same trench.



One section of the regimental bombing platoon was ordered to work along the trench to the objective and to establish a block on the other side of it. A second section was ordered to follow in close support, and a Stokes mortar at T was ordered to cooperate. Company bombing sections were to follow the second wave of their company to deal with enemy dugouts and to clear up generally.

2. *Narrative.*—The first bombing section moved up to block V, and the second wave, moving out into No Man's Land, commenced bombing along the trench.

They passed the first enemy block (W) and were halfway to the second (X) when the assault was delivered by the first wave. From then to the first objective very little opposition was encountered.

On arriving at the intersection of trench V W X with trench C D they were assailed with bombs on their right and left from this latter trench, and also from Z, where enemy had established another block.

The trench mortar, being quickly informed, opened fire on Z.

The second bombing section was ordered to deal with the enemy's bombers on the right and left, while the first bombing section continued the advance under cover of the trench mortar, which increased its range about 15 yards every 3 shots.

Z was passed and a block established about 20 yards on the other side of it.

3. *Remarks.*—The total casualties of the two bombing sections were 6 wounded, whilst 10 of the enemy were found dead in the trench V W X Z.

The system of replacing casualties worked satisfactorily.

The bombers had no difficulty in following up the trench-mortar fire.

EXAMPLE II.—ATTACK BY —— BATTALION, WORCESTERSHIRE REGIMENT (24TH AUGUST).

1. This battalion, in conjunction with — Battalion, Wilts Regiment, carried out a successful attack on the Hindenburg trench. The right company was given special instructions to guard its right flank.

2. The objective was reached without much difficulty. Two squads of bombers, each consisting of 10 men, including two Mills rifle bombers, were then ordered to hold point X, and, if possible, push on to Y, supported by a Lewis gun.

At point X a party of six enemy bombers was encountered and driven back by two bombers after an encounter of a few seconds. Two bays behind them a party of 12 to 15 bombers was discovered; it stood its ground. It was evidently covering a machine-gun team, which was seen to be trying to mount a machine gun. This opposition was dealt with as follows:

(*a*) Riflemen were at once thrown out on either flank in shell holes, well out of bombing range.

(*b*) A Lewis gun was brought into action on top of a high traverse, enfilading the whole enemy trench, and immediately putting the enemy's machine gun out of action.

(*c*) A bombing squad attacked the enemy as follows: One officer with periscope (who also threw bombs), three bombers, each carrying 16 bombs, and a man with an artillery flag.

(*d*) A Stokes mortar fired on point Y throughout the operation.

After about 15 minutes' fighting the entire trench was captured and 23 prisoners taken. We suffered no casualties from the enemy's bombs.

3. The success of the operation was due to the following facts:

(*a*) The promptitude with which the Lewis gun and snipers got into position, thereby preventing the enemy from throwing his bombs to the best advantage, while our men outthrew him throughout.

(*b*) The composition of the bombing team prevented crowding, thereby obviating casualties and indiscriminate throwing.

The use of the periscope rendered the employment of bayonet men unnecessary and made it possible to observe each bomber's individual aim.

The artillery flag, though disclosing our position, was most necessary as a guide to the sniper, Lewis gun, and trench mortar battery.

(*c*) A few smoke bombs were carried, and two of the four dugouts found had to be burned out, as Germans were found coming out of them after the bombing party had passed and showed fight.

(*d*) The Stokes gun kept up an accurate fire on Point Y, and thereby probably prevented the retirement of the Germans who were captured.

No Mills rifle grenades were used, as our men successfully outthrew the enemy with hand grenades.

The battalion made a successful attack on a German strong point and bombed up the trench to the north of it.

The attack was made about midnight; during the day our artillery and Stokes mortars had shelled the strong point. This was V shaped, vide sketch.

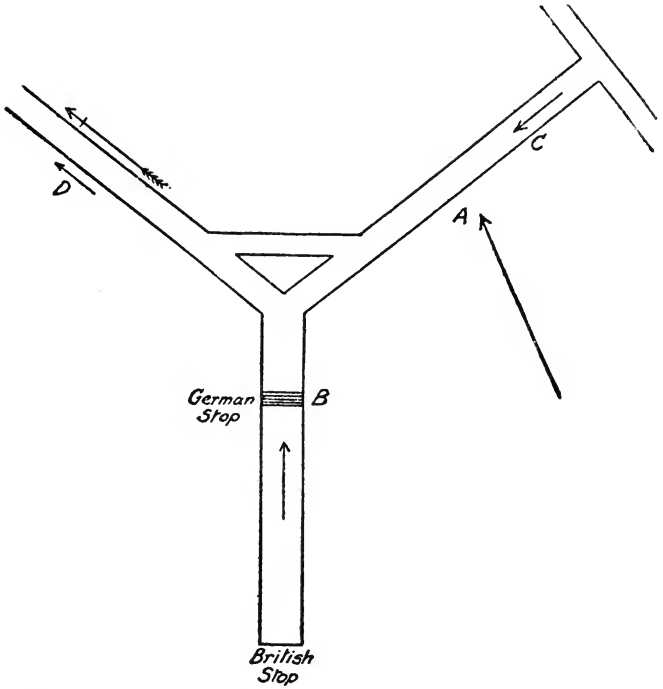
Two platoons were directed to attack across the open (A on sketch), and bombing parties to bomb up the trench on either side (B and C on sketch), and to join up with them.

Immediately before the assault the strong point was bombarded for a few minutes with rifle grenades. The enterprise was carefully timed, and each party reached its objective simultaneously and soon joined hands.

A considerable number of Germans were found in the deep dugouts and taken prisoners. Others ran up the trench (D on sketch), followed by our bombers, who killed several and took more prisoners; but finding they had pushed beyond their objective and that the enemy were rallying and trying to surround them they retired to the bomb stop which was being made at the prearranged objective.

As but little opposition was at first met with the bombing parties pushed on very quickly.

Branching off to the right and left were a large number of deep dugouts and trenches, and after finding "stops" over each dugout



bombing teams for each branch trench and working parties to make barricades few men were left when the final objective was reached—where the most resistance was experienced. It was found more satisfactory to attack by daylight than by night, owing to the difficulty of seeing where the various dugouts and branch trenches led to.

PLATE 1.

THROWING STANDING IN THE OPEN.

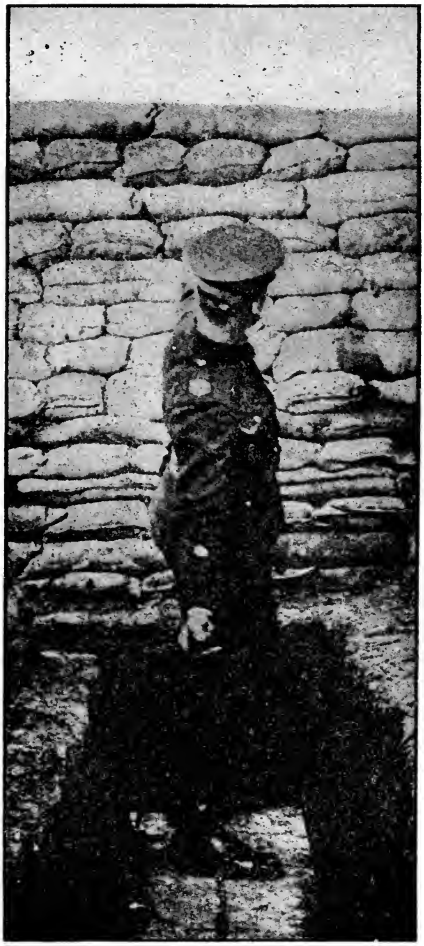
PLATE 1A.

POSITION AFTER THROWING.

PLATE 2.

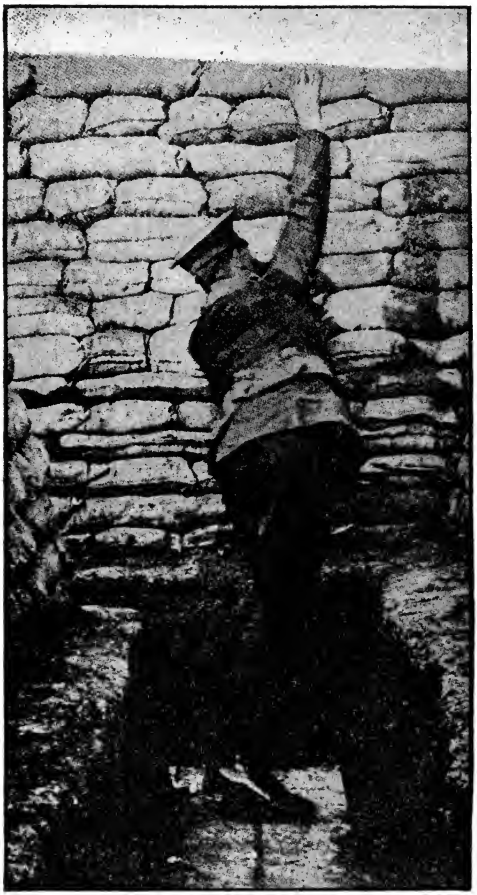
THROWING KNEELING.

PLATE 3.



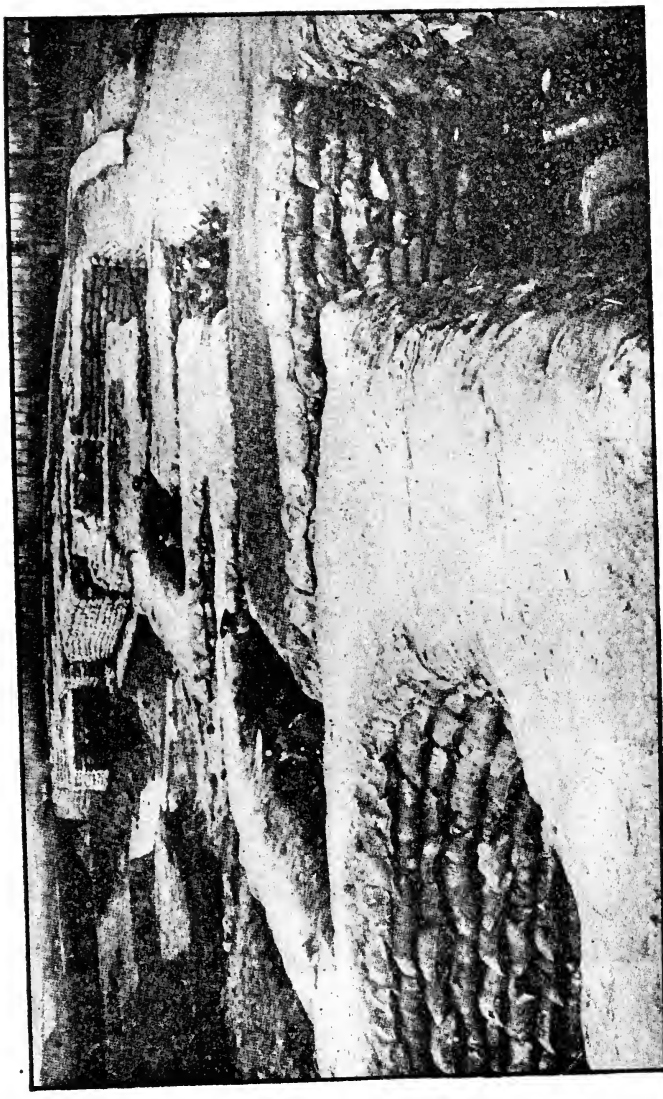
THROWING FROM A DEEP TRENCH.

PLATE 3A.



After Throwing from a Deep Trench.

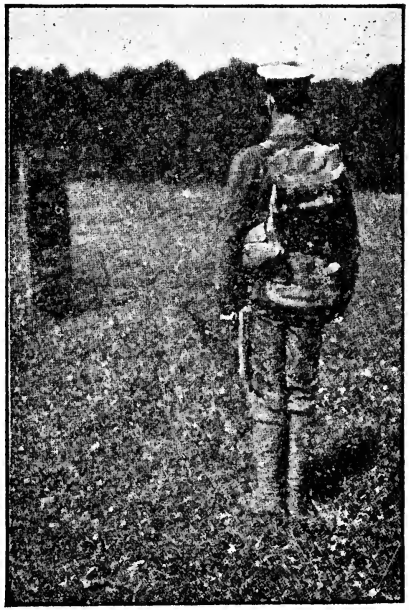
PLATE 4.



PARTY WORKING DOWN A TRENCH.

PLATE 5.

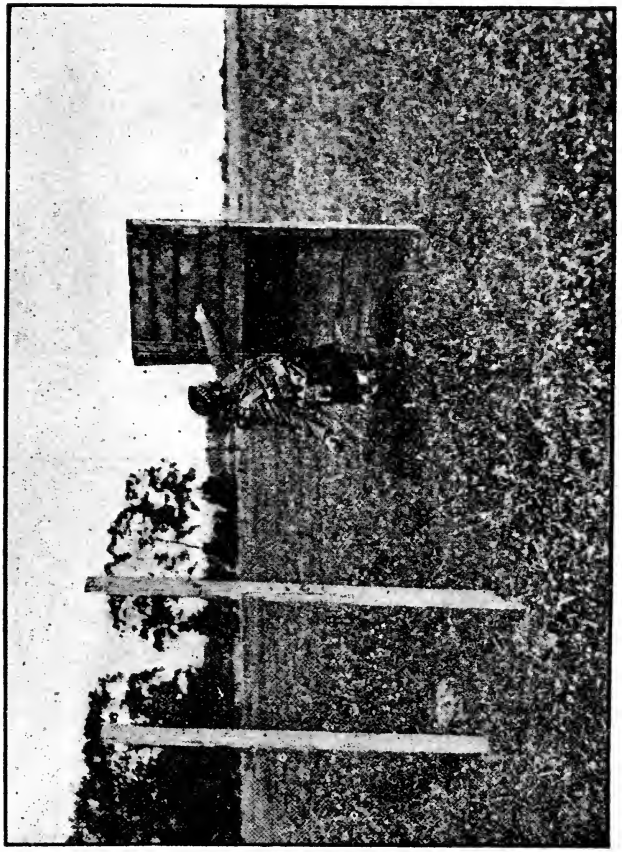
PLATE 5A.



DRESS FOR STANDARD TESTS.

Drill order with haversack, water bottle, and entrenching tool. No rifle.

PLATE 6.



THROWING FROM THE CAGE.

PLATE 7.

FIRING NO. 23 GRENADE.

(Butt on ground.)

PLATE 9.

FIRING NO. 23 GRENADE.

(Butt to shoulder.)

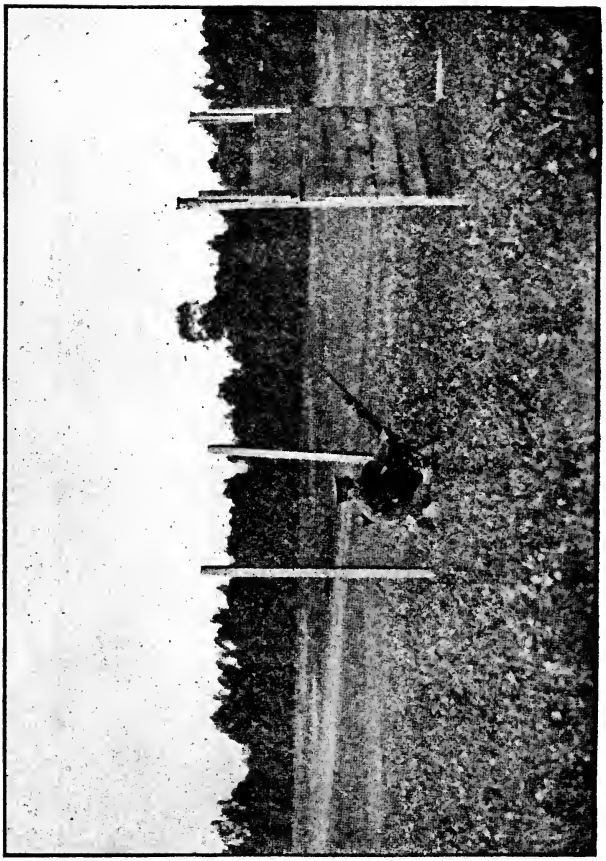
PLATE 8.

PLATE 8A.

FIRING NO. 23 GRENADE.

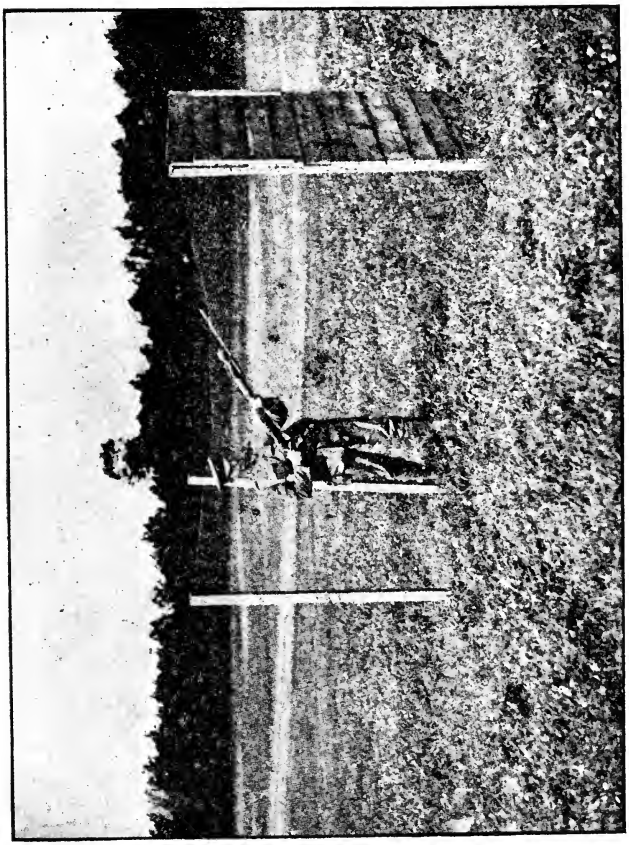
From "on guard" position. NOTE.—The butt clear of the hip.

PLATE 10.



FIRING BEHIND COVER 4′ 6″ HIGH.

PLATE 10A.



FIRING BEHIND COVER 6′ HIGH.